Electrical World

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Welfare Work of the Industry

APPALLING as was the loss of life attending the capsizing of the steamer Eastland in the Chicago River last week, the catastrophe was not without some comfort to the bereaved. Out of the darkness of despair comes the bright assurance that the Western Electric Company has made ample provision for relieving the distress occasioned by the accident, in which it, too, was a heavy loser; for hundreds of its most experienced employees were drowned. In the face of such a calamity the industry may well view with satisfaction its great work in the interest of the craft. Long before workmen's compensation acts were written on the statute books, economic and humanitarian movements were set on foot by it. Not only has it been foremost in its advocacy of governmental regulation, but it has also been the leader in all classes of welfare work, beneficial associations, service annuity plans, saving funds, sanitation and accident prevention. While lost loved ones cannot be restored, it is a source of consolation for those connected with the electrical industry to feel that, should death overtake them, their widows and orphans will not be neglected.

Electrical Exports

THE figures of electrical export trade for May do not sustain, as they might be expected to do, the figures of April, which showed a gain of about $250,000 over the previous year, the totals being respectively $1,741,551 and $2,055,375. We now have the May figures, which are $1,802,209, as compared with $2,040,720 a year ago. This may be a mere fluctuation in the time of delivery and the filling of orders, but it involves, anyhow, an apparent slight recession. The figures for the eleven months of the fiscal year inclusive of May are more revelatory of the fact that up to the present time we have not been able to seize the opportunity of supplying neutral markets, deprived by the war of apparatus and appliances from Europe. Or may not the fact presently emerge that the various dams of blockade, submarine attack, high rates of freight and insurance do not hold up European exports. Probably the real facts will not be known until the present infernal war is over; but in the meantime American activity and curiosity as to inviting foreign markets should become thoroughly aroused. For the present it will suffice to note, as one indication, that the total electrical exports for the eleven months of 1914-15 were only $17,724,676, as compared with $23,610,407 in 1913-14 and $24,458,084 in 1912-13. Here is the evidence of the adverse influence of the Great War, and it may be sincerely regretted that the other figures of our electrical manufacturers, many of whom are engaged in the production of munitions of war, could not be added to the electrical output, nearly all of which is a benefaction to the world rather than intended for destruction and desolation.

The New York Constitutional Amendment

THE proposed constitutional amendment presented to the New York Constitutional Convention by the public utilities committee this week is a step toward removal of the Public Service Commissions from interference by the Legislature. It is also an apparently reluctant move toward curtailment of the rate-making power of the Legislature. The provision that commissioners now in office shall continue until the expiration of their terms is a measure adopted clearly to protect the Democrats whom the Republicans planned to investigate out of office. As authority is given to the Legislature to change the jurisdiction, powers and duties of the commissions except as to certain matters, the compromise nature of the important amendment on rate-making may be inferred. The committee would provide that "the Legislature shall not enact any law prescribing a rate, or charge, or a standard of service, equipment or operation . . . until after it has received from one of the commissions a report made after investigation and hearing," or until after the expiration of a certain period following a request for such report. The report is not to bind the Legislature, is not to prevent it from taking such action as it likes, is not even necessarily to be considered. Having the report, the Legislature may swagger on in the same irresponsible way that it usually takes when it acts without investigation. The only change made by the proposed amendment is that it will be more difficult for the Legislature to make rates; it cannot rush rates through, and there will be at least the semblance of commission investigation and hearing. The lacking essential is a requirement that the results of the investigation shall be heeded.

Consumers as Investors

WITH present investment banking conditions it is natural that public utility managers should regard with eager interest the successful sale of stock to consumers by the Pacific Gas & Electric Company and the more recent similar offerings by the Northern States Power Company of Minneapolis and the Consolidated Gas, Electric Light & Power Company of Baltimore. The plan is unique in that it is not directed primarily

to the investment class but is designed to find investors among consumers and to make consumers want to be investors. The Pacific Gas & Electric Company is the most conspicuous case of the three mentioned, and undoubtedly its experience is due in part to the favorable psychological influences that surrounded it. Needing capital for extensions, the company availed itself of a suggestion of the Railroad Commission of California and created a new issue of first preferred stock. It secured authority from the commission with the implied approval which that carries. This in itself was an advertisement of great value. Sales of the issue to May 31, 1915, aggregated $6,039,600 to stockholders, $549,700 to employees, and $3,588,000 to "consumers and others." The average holdings are: Per stockholder, 89.61 shares; per employee, 3.37 shares; per consumer, 17.47 shares. The proportion taken by "consumers and others" is 35 per cent. The Baltimore company made its offering to consumers on June 10, and reports that up to the present time approximately 800 consumers have subscribed for an average of approximately five shares per subscription. In the offerings of the companies there was both a desire for more capital and a wish to bring consumers into more personal relations. The one is a plain business transaction, while, if the consumer-investors remain satisfied and loyal friends, the other involves a profound and far-reaching public policy.

Transmitting Energy to the Coal Mines

The steam plant of the Virginia Power Company described in the current issue is out of the ordinary in that the fuel is obtained, so to speak, at short range and the energy from it delivered at long range to help in the mining of coal elsewhere. Sooner or later waterfalls owned by the same company will be developed to help in the work. The generating plant is on the Kanawha River, about 15 miles from Charleston, W. Va. Its maximum rating is 20,600 kva. in 6600-volt generators delivering energy to the transmission line at 44,000 volts. The nature of the distribution leads to some unusual characteristics. There is no main distributing substation at all, but the transmission lines lead to customers' individual substations, varying in rating from 50 kva. to 600 kva., and the distributing lines cover about 185 miles of circuit, most of it on steel towers.

A most unusual feature of the plant is the arrangement of the transformers, the energy from the generators passing out of the building to a transformer plant built on the lines of the familiar out-of-doors substations now widely used. The steam plant is a very simple one, consisting of two turbine units served by six pairs of vertical water-tube boilers, each pair being rated at 1200 hp. The working pressure is 185 lb., but the super-temperature is slight, only 50 deg. Each of the three batteries of boilers is furnished with a steel stack 262 ft. high, which gives sufficient natural draft to force the boilers easily to double their rated output. Use is made of a very complete coal-handling equipment, comprising receiving hoppers, crushers and the necessary hoists capable of handling about 150 tons per hour. Each turbo-generator has its own condensing unit with a rating of 8000 gal. of water per minute taken from the river. For the feed water a filtering plant yielding 60,000 gal. per hour is equipped to reduce the scale-forming material in the water. The plant is characterized by unusual simplicity of equipment—simplicity to a degree which deserves to be imitated. It affords a capital demonstration of the efficiency of electric transmission thus to be able to distribute energy from a steam plant to a great group of coal mines.

Educating the Public in the Use of Light

A decrease in rates from 25 cents down to 10 cents per kilowatt-hour within fifteen years, and a corresponding reduction in specific consumption for incandescent lamps to less than one-third for the same candle-power, have been accompanied by vast increases in central-station revenue. In a general way, improvements in lamps, which at first seemed a menace to revenue, have been an aid to increased business. Another improvement, which has presented itself in an unmistakable manner, is that of higher effectiveness in the illumination from the lamps, and the central station has as an opportunity the additional responsibility of aiding its customers to gain the greatest effectiveness from the lighting equipment.

There is, of course, always the difficulty of an appreciation as to just what bearing improved service has on revenue. To render possible a higher illumination from the lamps quite naturally leads to the use of fewer lamps, provided the previous conditions in themselves were satisfactory—a condition not often true at the present time. On the other hand, if increased lamp efficiencies have resulted in a larger use of light, why should not higher effectiveness from the system as a result of a better lay-out or of intelligent hints on regular maintenance have a similar stimulating effect on the wider adoption of electric lighting? This progressive attitude, if accepted as a working standard, cannot prove other than a great help to the cause of good lighting.

As a matter of fact, however, the application and actual use of lamps rests so largely with the customer that the problem, in a peculiar manner, is difficult to handle. With the best of intentions on the part of the central station, proffered assistance in the correct use of light may quite readily lack in appeal owing to an absence of appreciation by the customer. A policy of education must, then, almost of necessity be adopted during the coming years wherein every available means shall be employed to promote this appreciation in the public mind, so essential to the attainment of higher illumination standards; and at the same time co-operation should be the objective point of the central station, a factor which is apt to be aided in such cases when those responsible for new customers have the assistance of men specially trained in the proper application and use of light.

Nor should this plan be limited to the central stations of larger size, although in these the practical aspects of maintaining expert assistance are possibly simplified by the diversity and number of new customers. In this connection the remark was recently made by an official of a moderate-sized lighting plant that the salary of a high-grade illuminating engineer to look after the study and design of lighting installations could not be afforded, but at the same time trade was often lost simply because no means were available for determining the best way in which to accomplish certain desired results. Obviously, this represents a very general condition of affairs in many plants and one for which sooner or later a solution should be found.

These observations suggest an almost equal need for education on the part of employees in the smaller stations. The simpler principles of good lighting are available to all, and many cases could be greatly improved by a little judgment based on a knowledge of these principles. Again, it is possible that at some future time the lighting in certain cases will, to a degree at least, be standardized, and a set of simple rules, if made available by such standards, would doubtless be most serviceable. However, the complexity of the lighting situation at present in the vast array of types of equipment and the innumerable ways in which different cases are handled, does not promise much in the way of standards in the immediate future so far as equipment is concerned, whereas standards in the elementary principles of illumination are generally recognized and accepted in practice.

Color and Stagecraft

An extremely valuable and suggestive article by Mr. Bassett Jones beginning in this issue deals with a subject on which the literature has hitherto been very scant. In fact, outside of the personal knowledge of a few wizards of the scenarium there is little to serve for a guide in the working out of stage effects. Of published matter there is a singular dearth. There are scattered articles, mostly of a very popular character, a single small volume in German on stage lighting, and beyond that practically nothing. Therefore Mr. Jones' article, with its details of methods actually utilized and found successful, is a most welcome addition to the art of the stage, which signifies primarily the art of illusion, combined with esthetic effects of a very intricate character. The bearing of the illumination upon this web of illusion is the fundamental feature to which Mr. Jones has directed his attention, with what skill and success his article well shows. He deals specially with the possibilities of color effects as such both in adding to the consistency of the scene and in giving to it a new charm derived purely from the esthetic value of color. These two are quite distinct. The first has to do with the psychology of stagecraft, and the last named with its esthetics expanded in a new direction.

The familiar tasks of scenic artists in obtaining striking illusion in spite of limitations of material and space have depended always to a limited extent on the deft application of lighting, without illumination having as yet taken its proper place of importance. Few outside of the profession realize the highly specialized knowledge or intuition which enabled, for example, the late Sir Henry Irving to work miracles with light and shade and perspective in the setting of some of his plays. By the applications of color as represented in concrete form by special lamps and reflectors an entirely new series of possibilities comes to light. As a single example mention may be made of Mr. Jones' ingenious application of superimposed illuminations in blue and amber to bring out the high lights in synthetic white, while leaving a splendor of color in the folds of drapery. Again, the play of color in harmony with the action on the stage and the introduction of the changing hues produced by superposing and dimming flood-lighting in the three primary colors give a vastly enhanced possibility of obtaining rich and sympathetic effects.

Not the least valuable part of Mr. Jones' article is the description in detail of the lighting units employed in practical service. The demands of the stage, and especially the demands of the traveling company, require apparatus at once strong and simple, capable of being operated from any source of electrical supply which may be at hand, and convenient enough for ready transportation to places generally inadequately equipped. The reduction of the necessary color-modifying apparatus and sources of light to a practical form adapted to the needs of the stage is a long step in advance of trusting to a few portable arc lamps and what meager equipment the ordinary theater is likely to furnish. Most important of all from the practical standpoint was the reduction of the whole system of lighting to terms of incandescent lamps with concentrated filaments, thus providing powerful light sources, thanks to the modern gas-filled electric lamps, sound from the standpoint of fire risk, perfectly steady in output, and requiring no skilled attendance. True enough, the color of the light from the gas-filled lamp is far from white, but it is a well-known psychological fact that, in lack of any special clew to color, as by simultaneous contrast, the eye grades as white almost any very bright light. Our memory for color is so inexact that it is well-nigh impossible to appreciate the immense difference in hue between noonday daylight and the diffused light at sunset. One can get along, therefore, very well with incandescent lamps, especially by a little help from color screens, producing by no means the artificial daylight of the specialist, but something quite near enough to it for stage service. We commend to our readers, even to those not particularly interested in stagecraft, a careful study of the most subtle and ingenious suggestions to be found in Mr. Jones' article. With all their helpfulness, they still only touch the edge of a branch of art the extent of which it is difficult to estimate. From a practical standpoint it is likely to lead to the more general employment of color magic in stagecraft, hitherto grasped by few and practiced by still fewer.

LETTERS TO THE EDITOR

Uniform Electric Rates Based on Costs

To the Editor of the ELECTRICAL WORLD:

SIR:—The letter of Mr. William Adams in your issue of July 17 is very interesting, as it shows distinctly the trend of mind of the central-station men. He states: "Adjusting rates so that the total of all the rates is equal to cost, plus a fair profit, tends toward serving the public to the best advantage." Such adjustments of rates are fine for the corporations, but not for the individuals being served. Such an arrangement must make it possible to sell energy to anyone at a price below the cost at which he can produce it, no matter how low that cost may be, provided that sufficiently high rates may be charged against those people who are in no position to produce the energy for themselves.

Assume that a power plant has two classes of customers, A and B. Each class requires a plant equipment of 10,000 kw. Class A consists of many customers, therefore the cost of the plant is assumed at $300 per kilowatt. Class B consists of only one customer, and the cost of the plant is assumed to be $100 per kilowatt. Each class uses 15,000,000 kw.-hr. a year.

Consider Class A alone:

The total investment is		$3,000,000.00
Fixed charges at 15 per cent	$450,000.00	
Operating charges, 5 cents per kw.-hr.	750,000.00	
Total cost		$1,200,000.00
The energy is sold at 10 cents per kw.-hr.; the return therefore is		1,500,000.00
Net return		$300,000.00

or 10 per cent on the investment.

Class B:

The total investment is		$1,000,000.00
Fixed costs	$150,000.00	
Operating costs, 1.5 cents per kw.-hr.	225,000.00	
Total cost		$375,000.00
The return is		450,000.00
Net return		$75,000.00

or 7.5 per cent on the investment.

Solely as a matter of comparison, I have assumed that the return in this case is the same percentage of the operating charges as with Class A, or 3 cents.

Let us combine the two loads:

The total investment would be		$4,000,000.00
Fixed costs	$600,000.00	
Operating costs	975,000.00	
Total cost		$1,575,000.00
The return is		1,950,000.00
Net return		$375,000.00

or 9.35 per cent on the investment.

In other words, the owners of the plant are worse off on the combined load than they would be by supplying Class A load alone.

Now, the Class B customer refuses to pay more than 1.5 cents per kilowatt-hour, because he can produce energy for that price.

The cost, as before, is		$1,575,000.00
The return, however, is only		1,725,000.00
Making, net		$150,000.00

or 3.75 per cent on the investment.

The power plant would be better off without the Class B load, for even at 9 cents per kilowatt-hour the Class A load will return 5 per cent on the amount invested.

Let us go a little further, however. The Class A load is doubled, and with it the plant, while the Class B load still pays only 1.5 cents per kilowatt-hour on its load and investment:

The total investment has increased to		$7,000,000.00
The fixed costs to	$1,050,000.00	
Operating costs, Class A, 30,000,000 kw.-hr., at 5 cents	1,500,000.00	
Operating costs, Class B, 15,000,000 kw.-hr., at 1.5 cents	225,000.00	
Making total costs		$2,775,000.00
The return is		3,225,000.00
Net return		$450,000.00

or 6.43 per cent on the investment.

The Class A load continues to increase until it is tripled, while the Class B load remains the same:

The investment has increased to		$10,000,000.00
Fixed costs to	$1,500,000.00	
Operating costs to	2,475,000.00	
Total operating costs		$3,975,000.00
The return is		4,725,000.00
Net return		$750,000.00

or 7.5 per cent on the investment.

Energy can now be even given to Class B with the following results:

Costs, as before		$3,975,000.00
Return from Class A load alone		4,500,000.00
Net return		$525,000.00

or 5.25 per cent on the investment.

This is a much better condition, so far as the power plant is concerned, than where Class A and Class B were of the same size, with Class B paying 1.5 cents. The Class B load has nothing to do with this condition. It has remained unchanged. The improvement has come solely through the increase in the 10-cent load. To my mind, this improvement does not justify the Class B load in obtaining its energy for nothing, although it may give a greater investment return to the plant owners.

That this condition is not fanciful can readily be shown. Taking the figures of the Boston Edison company for the years 1913 and 1914, I have worked out the accompanying curve, which shows that if 51.8 per cent of the energy sold by the company had been sold at 10 cents per kilowatt-hour the rest of the energy could have been given away without affecting the net income of the plant. If 40 per cent of the energy had been sold at 10 cents per kilowatt-hour, the rest could have been sold at an average price of 1.98 cents, etc. The percentage of energy sold by the Edison company at 10 cents per kilowatt-hour I do not know, but it runs between 20 per cent and 25 per cent and is constantly increasing, and as it increases the lower-price energy can be sold to others without materially affecting the income returns to the stockholders.

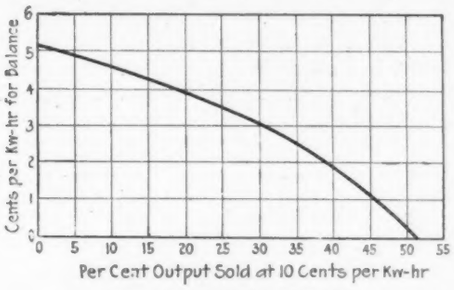
The same general point applies to the small motor user who pays a big price for his service.

An investigation of the Edison company's returns shows that during the last three years there has been a constant reduction in the average price per kilowatt-hour, it being 5.38 cents in 1912, 5.21 cents in 1913, and 5.18 cents in 1914. It was also found that with the increased motor load the price per kilowatt-hour decreased as follows: 3.95 cents in 1912, 3.72 cents in 1913, and 3.68 cents in 1914.

The average price for domestic or commercial lighting

remained unchanged during the years 1913 and 1914, but it was reduced in the years 1912 and 1913 on account of a reduction from 11 cents to 10 cents in the maximum price to customers.

It is interesting to know that the difference between the price paid in 1914 and the price paid in 1913 on the motor load will exactly make up the difference in



COST OF EXCESS ENERGY

returns per kilowatt-hour for that year. That is to say, a reduction of the price from 3.72 cents to 3.68 cents is approximately $17,000. Adding this to the income for that year, we find that the average price comes to 5.21 cents. The effect on the profits of the company has been as follows: The net return to the company in 1912 was 6.86 per cent on the investment; in 1913, 6.24 per cent, and in 1914, 5.99 per cent. These figures confirm the theoretical opinion given in the preliminary statement, and show conclusively to my mind that the large motor load is being paid for by the 10-cent lighting load, particularly those large users who obtain their energy at very low price. Of course, the load as a whole cannot be understood to be non-dividend-paying, but that energy which is sold at a price equal to operating cost or less is sold at a loss. The company may make money enough out of the combined motor and lighting loads to show good interest on the investment, but this comes from the lighting load primarily, as the motor load does not pay its fixed charges and operating expenses.

I think enough has been said to show the unjustness and failure of adjusting rates in accordance with the theory of Mr. Adams. If more is wanted, plenty more may be said.

I think also this answers Mr. Adams' question as regards the Third Avenue railroad, although possibly it might be advisable to call his attention to the fact, as stated in my previous letter, that the Third Avenue railroad did not operate its power plant to make a profit, but operated it solely for the purpose of running its cars. Such profits as may have come came through the cars and not through the operation of the power plant. The minute, however, that the Edison company took it over a profit had to be made from the operation of this plant, and therefore it is of vital interest to know what price was paid for the plant, despite Mr. Adams' question of muck-raking. Muck-raking consists in stating things which are not so, but does not consist in making a pertinent inquiry as to facts. The question of the amount of profit returned to the Edison company through the operation of the Third Avenue railroad station is not material, so long as it returns a fair profit; but the fact that it may return a profit of 0.5 per cent on the investment is not sufficient to justify its being taken over, because the Edison company pays dividends which are far greater than 0.5 per cent on its investment.

If some portion of the investment pays less than the average rate, some other portion must pay more, and this is not correct.

As for the central-station engineer making mistakes in building large stations, that depends on conditions. The only reason that central stations can do as they have done is because there is no competition to reduce the rates to the small consumers, whereas there is competition to reduce the rates to the large consumers; that is, competition between the corporation and the large consumers themselves. I believe that if two competing companies existed both stations would be bigger and both do a better paying business than the one does now.

Mr. Adams states that a customer with a 10-watt lamp requires a service costing $100 and a meter costing from $5 to $10, as well as meter readers, accountants, postage, etc. Let us agree to all this; but, unless I am very much mistaken, no plant will put in a service of this character except with the understanding of a minimum charge sufficient to cover all of the costs, and it is this minimum charge I referred to when I stated that there is a nine-dollar minimum charge, meaning by this that the minimum charge per year per meter is $9.

Boston, Mass. HENRY D. JACKSON.

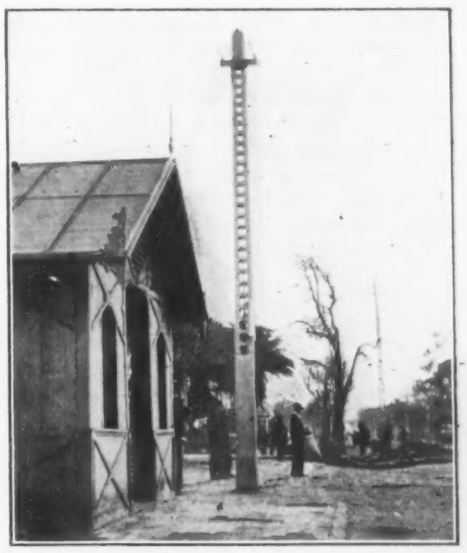
Concrete Transmission Poles

To the Editor of the ELECTRICAL WORLD:

SIR:—In view of the articles recently published relating to concrete poles in this country it is believed that a description of the concrete poles used in Spain and Italy will be of interest.

When the American engineer who is familiar with wood poles attempts to design a concrete pole he adopts first the familiar round or hexagonal shape without taking the stresses into consideration, whereas the European engineer analyzes the stresses involved and designs the pole in accordance therewith.

Herewith is illustrated a type of pole that has been used extensively in Spain and Italy. In order to prevent climbing, the pole is built solid for about 7 ft. above the sidewalk, but the other part of the pole is as



HOLLOW-CONCRETE POLE USED IN SPAIN AND ITALY

light as is consistent with adequate strength. Incidentally, it is worth noting that in Italy steel poles are always thoroughly protected against climbing. One of the best examples of well-designed concrete poles is found on the electrical section of the Midi railroad in France.

Indianapolis, Ind. ALEX. R. HOLLIDAY.

Action of Engineering Societies on Naval Advisory Board

Engineering societies have taken steps promptly to carry out the suggestions of Secretary of the Navy Daniels that members be named for appointment on the Naval Advisory Board, of which Mr. Thomas A. Edison is to be the head.

Secretary Hutchinson of the American Institute of Electrical Engineers said that the first meeting of the new board of directors will be held on Aug. 10, and it is expected that action on the request of Secretary Daniels will be taken at that time. In view of the desire that a decision should be made as soon as possible, it was impracticable to make a poll of all members of the Institute in connection with the selection of names. Letters have been sent, however, to all members of the board, asking for suggestions. The views of past-presidents have been requested. In order to sound sentiment in various parts of the country, all chairmen of sections have also been asked to make suggestions of names. After consideration of the suggestions from all of these quarters it is expected that a definite selection of two names for submission to Secretary Daniels will be made at the meeting.

The Inventors' Guild held a meeting at Delmonico's, New York, on the evening of July 27, and steps were taken to comply with the suggestion of Secretary Daniels. A resolution to this effect, proposed by Mr. Frank J. Sprague, was passed. Mr. Thomas Robins, secretary of the guild, stated to the ELECTRICAL WORLD that a brief statement reviewing the matter will be sent to members, who will be asked to suggest not less than two or more than four names. Inasmuch as it is recognized that members of the guild who are proposed for membership as its representatives on the Naval Advisory Board might also be named by other of the engineering societies, precautions have been taken by the guild to prevent this contingency. Under the plan followed members are to send their selected names by letter ballot on or before Aug. 5. The board of governors of the guild will meet on Aug. 6 and select three names from those submitted. In order to avoid duplication, the president, Dr. Edward Weston, is then to confer with officials of other technical bodies, and he will choose two of the three names for nomination to the board.

The council of the American Society of Mechanical Engineers now has the matter under consideration. As the next regular meeting of the council will not be held until October, the executive committee took the matter up immediately upon receipt of the letter from Secretary Daniels. It is taking a letter ballot of the council, and it is expected that the result can be transmitted to Secretary Daniels early in August.

Federal Commission Study of Foreign Trade Combinations

The Federal Trade Commission has placed in the field two special agents, who are making an investigation of details among manufacturers and exporters in connection with the study of foreign trade problems, particularly the advisability of allowing manufacturers and exporters to combine with common selling agencies.

The agents have been calling on manufacturers in Philadelphia, and are to call on others in New York and Boston, so that information furnished the commission at its public hearings recently may be supplemented. While a certain amount of valuable information was obtained at the recent hearings, the commission feels that personal calls on manufacturers and exporters by its special agents will result in "heart-to-heart" talks, which will be productive of more information.

Lamp Receptacle and Socket Section Formed by Associated Manufacturers

A meeting of the Associated Manufacturers of Electrical Supplies was held at the Hotel Biltmore, New York, on July 28. Out of twenty leading manufacturers who were invited to attend, seventeen were present, and a lamp receptacle and socket section was formed.

Mr. B. E. Salisbury was chairman of the meeting. Mr. Claude LeShelle was elected secretary of the section and Mr. W. D. Steele treasurer. Three nominations were made for chairman of the section, and these will be submitted to the board of governors of the Associated Manufacturers of Electrical Supplies, which will appoint one to be the permanent chairman of the section.

A list of rules was adopted by the section. The rules will be submitted to the board of governors of the Associated Manufacturers of Electrical Supplies and, if approved, will be adopted as permanent rules governing the section. As this was a meeting solely for organization purposes, no special business beyond the formal work of organization was transacted. Regular meetings of the section are to be held on the first Wednesdays in February, June and October of each year.

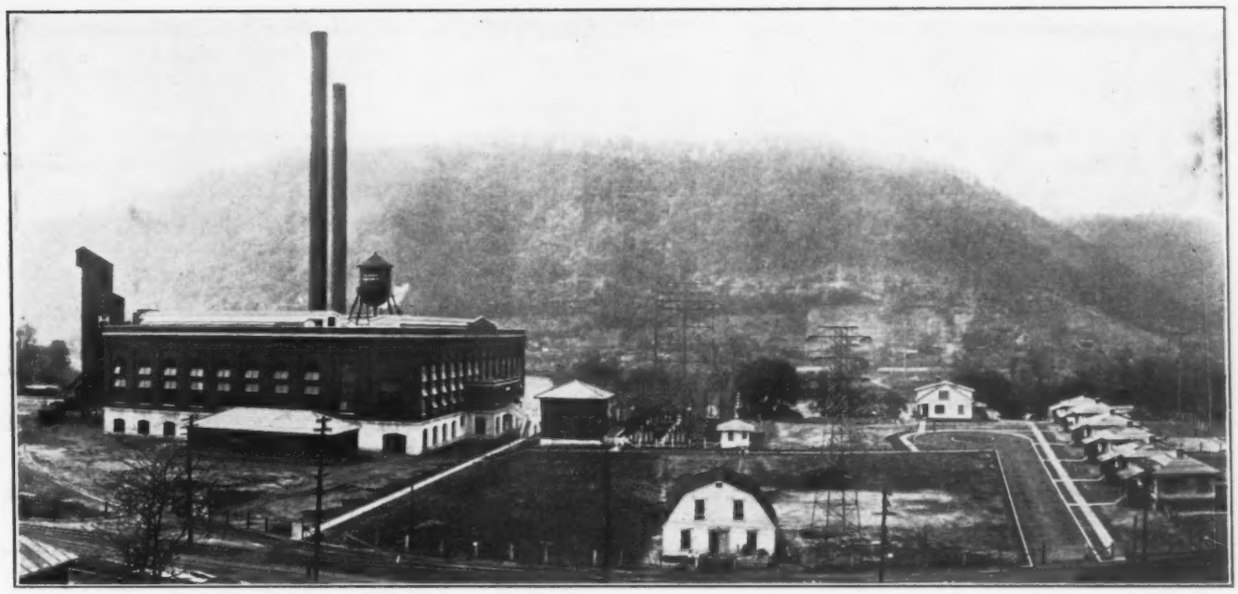
The meeting was attended by the following: Messrs. Harvey Hubbell and H. W. Bliven, Harvey Hubbell, Inc.; Flannery, Best Electric Company; H. B. Crouse, Crouse-Hinds Company; Shiras Morris, H. T. Paiste Company; John Weber, Weber Electric Company; J. C. Dallam, General Electric Company; A. H. Fleet, Cutler-Hammer Manufacturing Company; F. V. Burton, Bryant Electric Company; B. E. Salisbury, Pass & Seymour, Inc.; W. D. Steele, Benjamin Electric Manufacturing Company; Charles Wirt, Wirt Company; G. W. Goodrich, Bryant Electric Company; C. P. La Sheele, W. R. Ostrander & Company; George H. Maguire, E. H. Freeman Electric Company; Edward Grier, Arrow Electric Company; Peacock and Mackenzie, Union Electric Company; F. H. Chapman, Yost Electric Manufacturing Company; T. M. Debevoise, counsel Associated Manufacturers of Electrical Supplies; C. E. Dustin, general secretary Associated Manufacturers of Electrical Supplies.

Aeronautical Radio Experiments

It is expected that the aeronautical station of the Signal Corps of the army will experiment in the near future with radio apparatus for aeroplanes at the headquarters at Fort Sill, Okla., to which the station has just been removed. A number of improvements have been made upon the crude aeronautical radio apparatus which was invented by the Signal Corps in 1912, although as yet no method of using receiving devices has been found; because of the noise of the aeroplane engines, it is apparently impossible to receive messages.

Using apparatus of about 0.5 kw., the Signal Corps has found it possible to send about 17 miles, although it is now stated in Washington that this distance may be increased in the near future to 25 or 30 miles. The apparatus now weighs about 75 lb., and the various devices are distributed through the aeroplane in several little boxes at convenient points. The operating key is strapped to the leg of the operator. The generator is driven by a chain attached to the aeroplane engine.

None but the very largest aeroplanes in the war now are equipped with radio. Signaling during the war has been confined largely to visual signal devices. The United States Signal Corps hopes to develop the aeroplane radio. In the past lack of money and officers has prevented this. The Fort Sill aeroplane station is in charge of Capt. B. D. Foulois, United States Army.



Virginia Power Company's Cabin Creek Plant

A 20,600-Kva. Steam Station Serving Coal Mines from a 44,000-Volt Transmission System—Concentration of Equipment and Simplification of Operating Details

NOT many years ago it would have seemed ridiculous to suggest the construction of a medium-sized central generating station and transmission system for the sole purpose of supplying power to coal-mining companies in competition with the plants of these companies at their mines. However, such a plan has been put in operation in the Kanawha and New River coal fields of West Virginia, and a steam turbine station of 20,600-kva. maximum rating has been constructed to serve a district some 50 miles in radius by high-tension transmission lines and substations. This steam station, which is operated by the Virginia Power Company, is situated on the west bank of the Great Kanawha River at Cabin Creek Junction, about 15 miles southeast of Charleston, W. Va.

In addition to this steam station, the Virginia Power Company owns important sites for hydroelectric plants on the New River at Bluestone, Richmond Falls and Hawks Nest, W. Va. It is thought that a station will soon be required at Bluestone, where about 125,000 kw. is available, and conditions are favorable for the construction of a dam 140 ft. high with a crest length of about 2000 ft. Such a dam would create a lake with a surface area of about 8500 acres. The available power at Richmond Falls is estimated at 15,000 kw., and that at Hawks Nest at 30,000 kw. While the main load of the steam plant at present is due to coal-mining operations of some fifty mining companies connected to the system, there is ample opportunity for furnishing energy to other industries about Charleston and to public utilities.

The generating equipment installed in the Cabin Creek Junction steam station has a rating of 20,600 kva. in two Westinghouse-Parsons turbo-generators, with space provided and the layout of equipment arranged for a duplicate equipment. The generator pressure of 6600 volts is stepped up to 44,000 volts at an outdoor type of substation just outside the power station for the transmission of energy to the customers' substations. The transmission system has no main distributing substa-

FIG. 2—INFLUENT MOTOR AND STEAM-TURBINE-DRIVEN PUMPS FOR CONDENSING-WATER SUPPLY

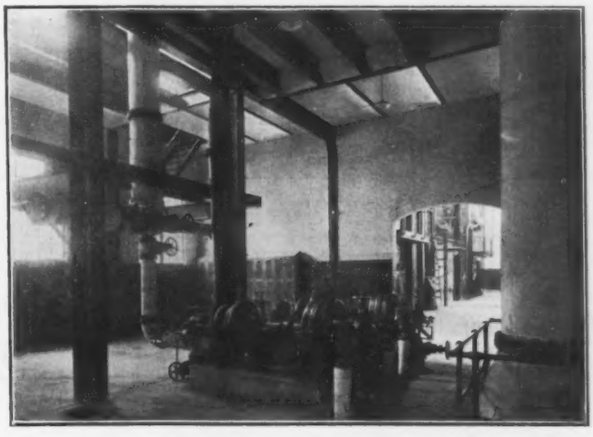


FIG. 3—PUMP ROOM, SHOWING DOUBLE-SUCTION, TRIPLEX-TURBINE-DRIVEN BOILER-FEED PUMPS

DETAILS OF VIRGINIA POWER COMPANY'S EQUIPMENT

CHARACTERISTICS OF SERVICE

Character of Load	Total Connected Load, Kva.	Total Hours Operated Annually	Maximum Combined Peak		Territory Served	
			Kw.	Date	District	No. Consumers Served
Coal mining, railways and lighting	21,500	8760	7000	June, 1915	Kanawha and New River coal fields	50 at present

PRIME MOVERS

No.	Rating	R.p.m.	Type	Stages	Connection with Generator
2	10,300 kva. maximum	1800	Westinghouse-Parsons steam turbines	Double-flow	Direct

STEAM GENERATING EQUIPMENT

Boilers							Grates	Stokers	
No.	Hp.	Effective Heating Surface	Type	Steam Pressure Lb. per Sq. In.	Superheat (in Deg. Fahr.)	Type of Superheater	Area per Boiler	Type	Drive
12	588	5882 sq. ft.	Rust vertical, two in one battery	180	50	B. & W.	120 sq. ft.	Murphy	Individual steam

FUEL

Kind	Heating Value	Ash Content	Average Cost at Plant per Ton	Storage Space Available	Method of Storing	Facilities for Receiving
Bituminous coal	12,800 lb.-Fahr. units per lb.	13.6 per cent	$0.95	1150 tons per bunker serving 12 boilers	Bunkers above boilers and in piles in open air	Rail

MAIN GENERATORS

No.	Voltage	Phases	Cycles	R.p.m.	Kva (Each)	Type	Neutra Grounded	Ventilation	Are Air Filters or Coolers Used?
2	6600	3	60	1800	6600 kw. at 80% power-factor	Westinghouse	Yes	Fans built in generator	Fine mesh screen filter; no coolers

EXCITING EQUIPMENT

Generators					Drive		Miscellaneous
No.	Voltage	R.p.m.	Kw.	Type	Type	Kw.	Voltage Regulators
2	125	1800	90	Westinghouse	Direct-connected to main turbine shaft	..	Tirrill
1	125	2400	100	Westinghouse	Independent steam turbine	125	....

TRANSFORMERS

No.	Kva. (Each)	Phases	Voltage		Connections		Type	Service	Type of Oil Filter
			Low	High	Low	High			
6	2750	1	6600	44,000	Δ	Δ	Westinghouse O-I., W-C. outdoor	Feed direct to customers' substations	Westinghouse with filter press pump and motor

SMOKESTACKS

No.	Minimum Cross-Section	Draft	Height	Shape	Material	Connection to Boilers
2	10 ft. 6 in. inside diam.	Natural	262 ft.	Circular	Steel	One to six boilers

DETAILS OF VIRGINIA POWER COMPANY'S EQUIPMENT—(*Continued*)

CONDENSERS AND PUMPS

CIRCULATING PUMPS

CONDENSERS						PUMPS					DRIVE	
No.	Rating	Vacuum	Temperature Injection Water	Type	Location with Respect to Unit Served	No.	RATING		Speed	Type	Type	Rating, Hp
							Gal. per Min.	Head				
2	8000 gal. per min. for 110,300 lb. steam per hour	28.5 in.	70 deg.	Westinghouse Leblanc	Directly under turbine	1	8,500	49 ft.	550	Centrifugal I. P. Morris Co.	Terry turbine	165
						2	17,000	49 ft.	385	Centrifugal I. P. Morris Co.	Westinghouse motors	320 hp., 440-volt, 60-cycle

BOILER-FEED HEATERS AND PUMPS

FEED-WATER HEATER			FEED PUMPS						
				PUMPS.				DRIVE	
No.	Rating	Type	No.	RATING		Speed, R.p.m.	Type	Type	Rating, Bhp
				Gal. per Min.	Head				
2	10,000 hp.	Open Cochrane	2	400	520 ft.	3000	Centrifugal	Westinghouse turbine	96

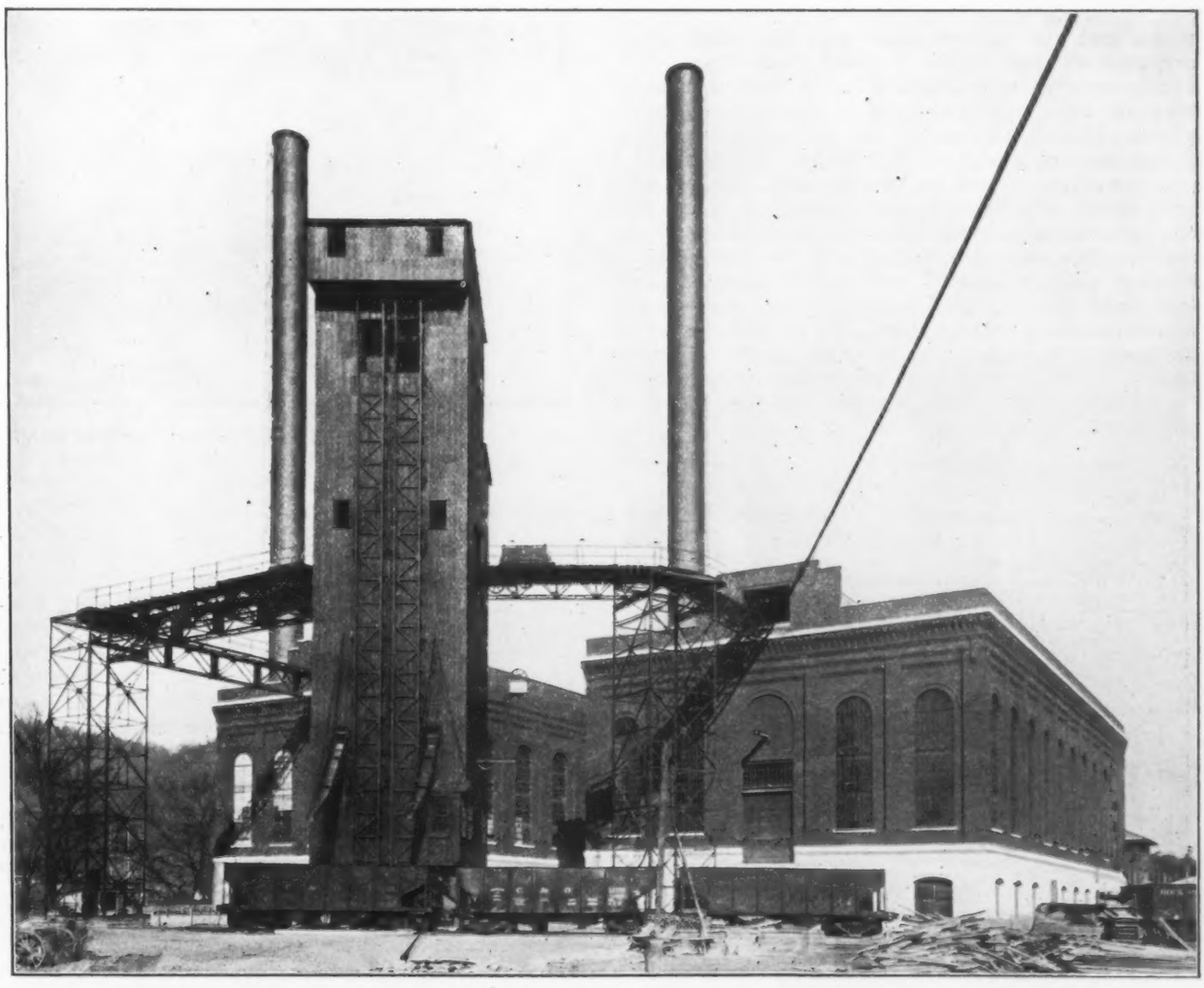


FIG. 4—BOILER-ROOM WING, COALING TOWER AND COAL TRESTLE FROM REAR OF POWER HOUSE

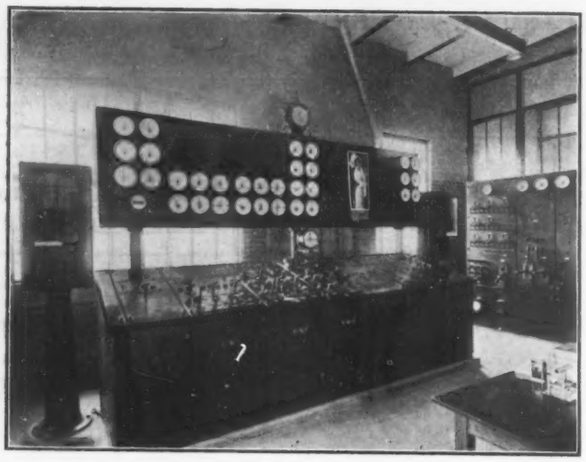


FIG. 5—BENCHBOARD IN CABIN CREEK JUNCTION POWER HOUSE

tions or centers of distribution, the lines leading directly from the outdoor substation at the power plant to the customers' substations, which vary in size from 50 kva. to 600 kva. and contain an aggregate of 21,500 kva. in single-phase transformers.

The equipment in the station is compactly arranged and the operating details have been simplified so that only seven men per shift are required.

Steam-Station Building

The steam-station building consists of two boiler rooms and one turbine room with the boiler rooms arranged at right angles to the turbine room. This arrangement gives a structure in the shape of a parallelogram with one side omitted, as shown in the accompanying plan of the station.

The building has a substructure of concrete and a superstructure of self-supporting steel incased with brick walls. The large windows have frames and sash of steel construction with sills and trim of white Georgia marble. The main and monitor roofs are constructed of concrete slabs, reinforced with ribbed metal and covered with four-ply bituminous roofing, flashed and counterflashed at the parapets. To prevent flowing of the compounds, bolted slag is spread on the roof surfaces. There are no basements in the structure, the lower floor being at ground grade with the operating floor about 15 ft. above. The floors are of reinforced slabs carried on steel frames designed for a gross loading of 400 lb. per square foot.

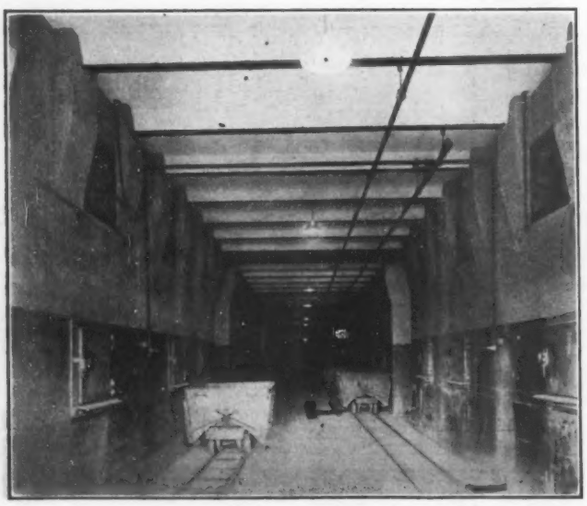


FIG. 6—ASH-HANDLING CARS IN BASEMENT OF BOILER HOUSE

Boiler-Room Equipment

When completed, the boiler plant will be arranged in two parts, each separately housed. The first one of the boiler houses now constructed contains six batteries of vertical water-tube high-pressure boilers with superheaters. Each battery consists of two 600-hp. boilers, or 7200 hp. as the full equipment for one boiler house. The boilers are equipped with automatic heavy-duty Murphy stokers in Dutch-oven setting. A pressure of 185 lb. is carried and steam is superheated 50 deg. A steel stack, 11 ft. 4 in. in inside diameter at the top and 262 ft. high, serves a section of three batteries. With natural draft this arrangement and design of boilers and stokers can be forced to 200 per cent rated output for peak loads. The superheaters used with the boilers are installed in the second pass. Steam flow meters are installed on each boiler. The loop system of piping is used and prime movers and auxiliaries are connected through welded receivers.

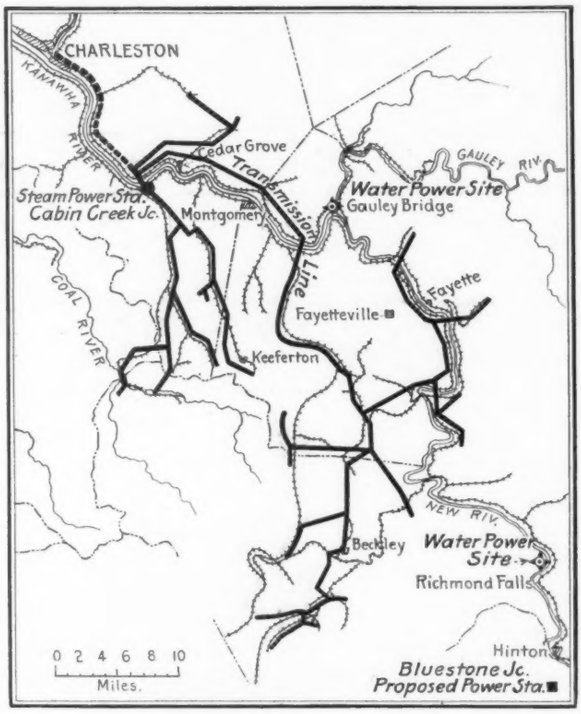


FIG. 7—MAP SHOWING STEAM STATION, WATER-POWER SITES AND TRANSMISSION LINES OF COMPANY

As shown in the accompanying section of the boiler room, each boiler house is equipped with structural-steel, concrete-lined elevated coal bunkers, of a capacity of 12 tons per lineal foot. On the ground floor of the boiler house commodious ash bunkers are arranged under the boilers with tracks in front so that the ashes can be raked out into 1-ton cars and delivered into an ash bunker at an outside track hopper.

Coal-Handling Equipment

The coal-handling arrangements, as shown in Fig. 4, consist of a structural steel tower containing coal-receiving hoppers, crushers and machinery for operating double-skip hoists. This equipment also handles outgoing ashes from the plant by means of separate ash hoppers arranged for this purpose.

A 50-ton track hopper at the bottom of the tower receives the incoming coal. The skips are then lowered

to a point below the discharge spout of this hopper and loaded by gravity from it. The charged skip is then hoisted to the top of the tower and dumped automatically into a crusher, and from this crusher the coal goes into cable cars, which deliver it to the overhead boiler-room bunkers and to an outdoor coal-storage pile. The maximum service for hoisting, crushing and conveying lump coal is about 150 tons per hour.

The ashes that come from the boiler room in 1-ton cars are dumped into a track bunker from which the coal skips are filled to lift the refuse to standard railway cars, which are hauled over the same track on which coal is received.

Boiler-Feed and Condenser Supply Pumps

Below the open feed-water heaters and purifiers situated between the two boiler rooms and installed on a level with the boiler-room floor are two 400-gal.-per-minute double-suction triplex turbine-driven boiler-feed

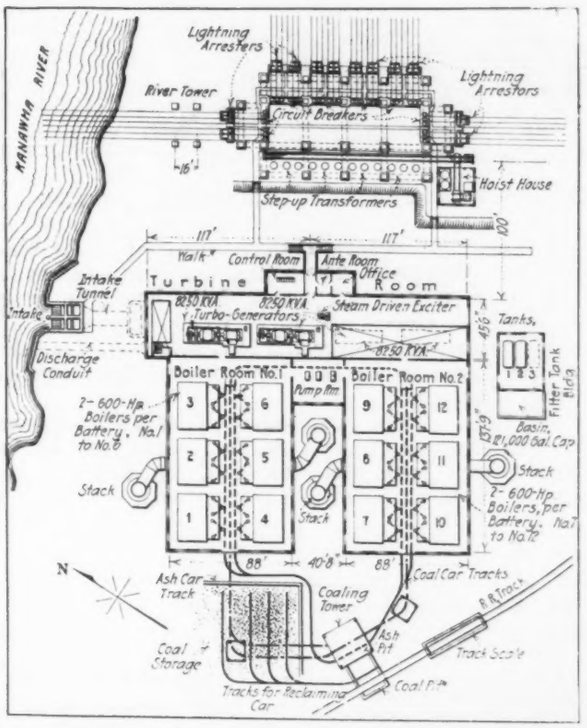


FIG. 8—PLAN OF CABIN CREEK JUNCTION STEAM STATION

pumps. To supply the condenser tunnel with water there are one 18-in. and two 24-in. turbine pumps with capacities of 17,000 gal. and 8500 gal. per minute. The 24-in. turbine pumps are driven by 320-hp. induction motors operating at 440 volts, sixty cycles, and the 18-in. pump is driven by a 165-hp. steam turbine. Two 1000-gal., 6-in. R. D. Wood double-section centrifugal pumps serve the house line and elevate the water to a 50,000-gal. storage tank either directly or through pressure filters for boiler-feed transformer cooling and general service. One of these centrifugal pumps is driven by a 75-hp. induction motor and the other by a 65-hp. re-entry steam turbine. Each of the two open-feed water heaters and purifiers is able to serve 10,000 hp. of boilers.

Turbines and Generators

The rating of each of the turbo-generators installed at 80 per cent power-factor is 6600 kw. These units are operated by horizontal Westinghouse-Parsons type double-flow steam turbines, each equipped with a 90-kw.

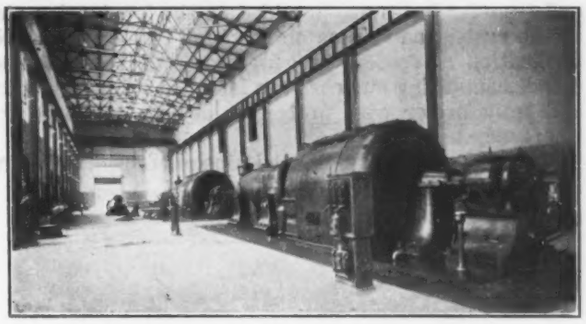


FIG. 9—TWO 8250-KVA. TURBO-GENERATORS IN TURBINE ROOM

directly connected exciter. A Westinghouse-Leblanc condenser is attached directly to the exhaust nozzle of each machine, with the auxiliary for the condensers consisting of only one prime mover, which is a re-entry steam turbine of 250 hp., operating at 185 lb. steam and 50 deg. superheat. The two main pumps for the condensers are directly connected to this 250-hp. steam turbine. The intake and discharge of condenser water is through tunnels beneath the turbine-room floor, and each condenser has a rating of 8000 gal. per minute for 110,300 lb. of steam per hour and an injection-water temperature of 70 deg.

The water for boiler-feed and condensing purposes is secured from the river near the station. A filtering equipment with a rated output of 60,000 gal. per hour is installed to reduce the scale-forming material in the water used for boiler feed.

Station Operation and Control

The station arrangement is such that it can be operated on the unit plan, a unit consisting of one prime mover, with its boilers, and a generator, with its step-up transformers and feeders. The benchboard and exciter switchboard are installed in one room on a level with the turbine-room floor and so arranged that all of the low-tension operation of switches, as well as all of the high-tension operation of switches for changes or connections, is made from this location. Unit buses

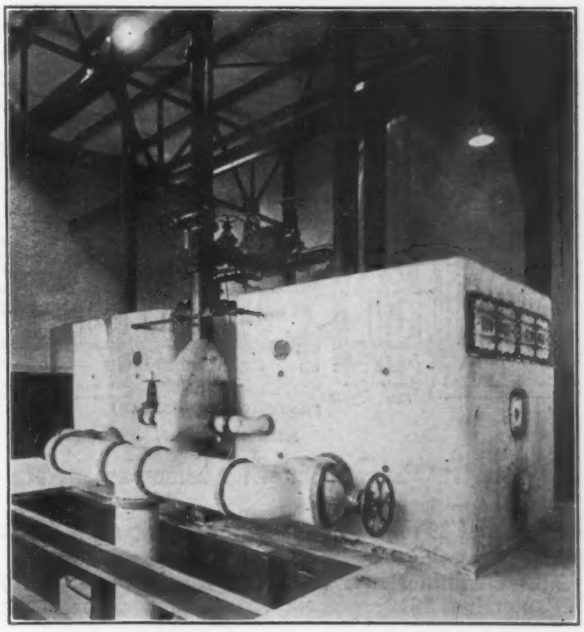


FIG. 10—OPEN FEED-WATER HEATERS IN HEATER ROOM OF POWER HOUSE

and transfer buses are provided on the low-tension side of the system as well as on the high-tension side. No duplication of feeders or generator switches is found, and disconnecting switches are installed on every switch and transformer with protective devices employed for emergency use.

The low-tension equipment is installed on the ground floor with the high-tension equipment entirely out of doors. Both low-tension and high-tension apparatus is remotely controlled, with the switches, buses, etc., in full view, for complete handling, as already mentioned. Six 2750-kva. oil-insulated, water-cooled, single-phase transformers are installed at the outdoor substation structure just outside the station, which raise the generating pressure from 6600 volts to 44,000 volts for transmission. The transmission system operated from this outdoor substation includes 156 miles of 44,000-volt steel-tower line. From the customers' substations to the mouths of mines about 29 miles of 2300-volt wooden-pole lines have been built.

The Virginia Power Company, which was organized in September, 1912, has acquired the physical properties and water rights of the Dominion Power Company in West Virginia and Virginia and of the New River Power Company in West Virginia. Through the purchase of these companies possession has been secured of valuable land and water rights along the New River in close proximity to a large and important mining district. The construction work of the Virginia Power Company has been financed by A. B. Leach & Company of New York City.

The turbo-generating equipment and practically all of the electrical apparatus were furnished by the Westinghouse companies. The boilers were furnished by the Babcock & Wilcox Company and the hydraulic pumps by the I. P. Morris and R. P. Wood companies. The steel transmission towers and steel poles were furnished by the American Bridge Company and the Archbold-Brady Company.

Mr. C. O. Lenz of 71 Broadway, New York City, who is chief engineer of the Virginia Power Company, has been entirely responsible for the design and construction of the steam plant and transmission system. Mr. P. G. Gossler of New York City is president of the company, Mr. Wilbur Tusch of New York secretary and treasurer, and Mr. H. G. Scott, Charleston, W. Va., general manager.

In a later issue of the ELECTRICAL WORLD the transmission line and the customers' substations will be described.

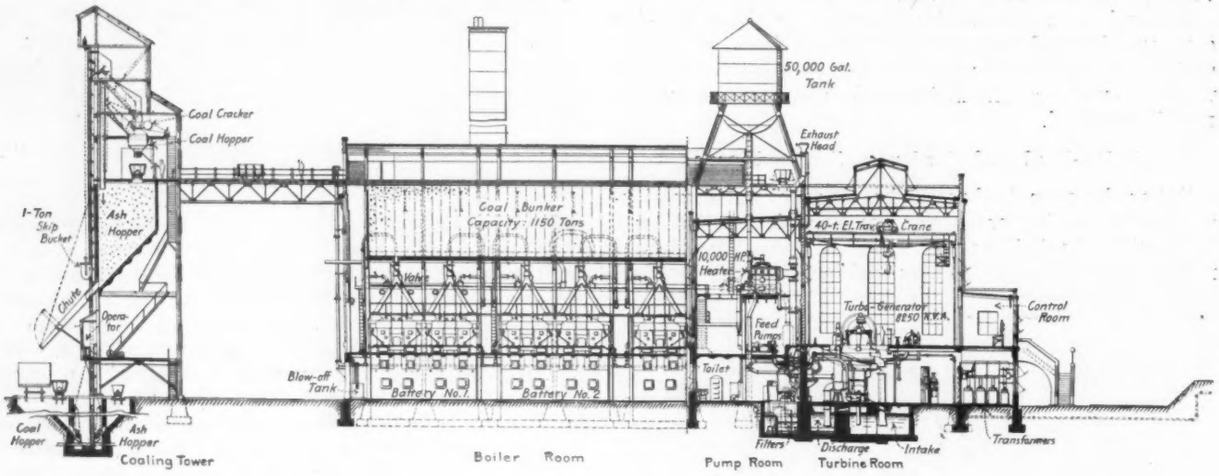


FIG. 11—SECTION SHOWING COALING TOWER, BOILER, PUMP AND TURBINE ROOMS AT CABIN CREEK JUNCTION

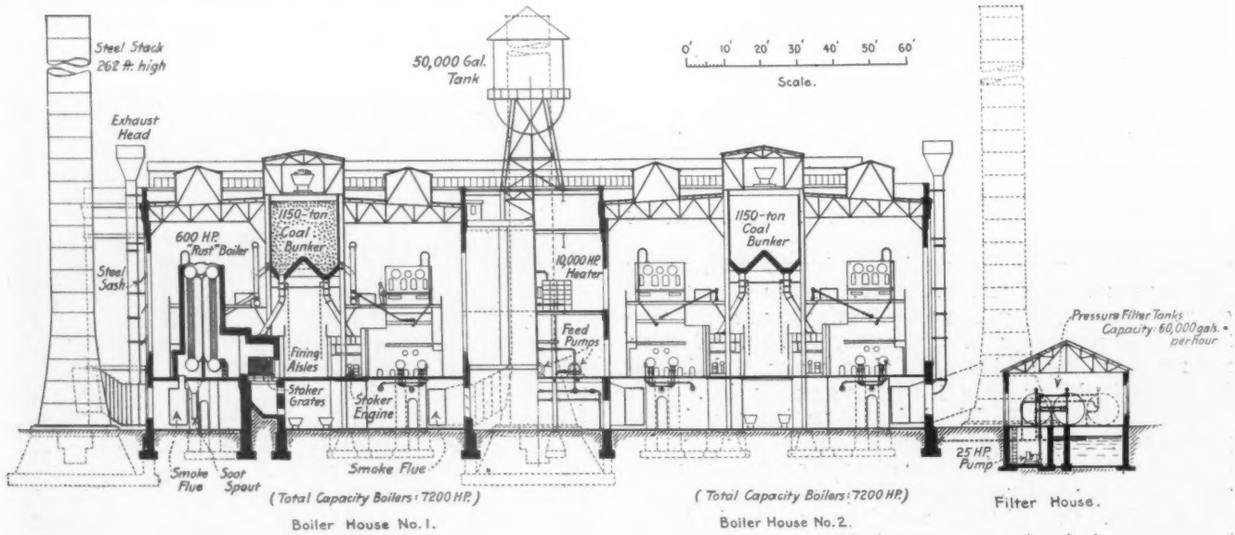


FIG. 12—SECTION SHOWING BOILER ROOMS, PUMP ROOM AND FILTER HOUSE AT CABIN CREEK JUNCTION

Mobile Color and Stage Lighting—I

An Analysis of the Color, Intensity and Tone of Light, and a Discussion of Their Practical Application in Stage Lighting

BY BASSETT JONES

IT is a strange fact that for many years little or no improvement in either method or apparatus has been made in stage lighting. Practically all, if not all, theaters in this country, and all but a few subsidized theaters abroad, are still depending on whitewashed tin bent in various shapes, mostly calculated to bottle up light, as a means of distributing the light of incandescent lamps over the stage and scenery. The lighting devices used are not only inefficient from a luminous standpoint but are also clumsy and difficult to handle. Such devices make it almost impossible to introduce any degree of flexibility in adjustment or in the order of effects obtained, and they require a large and expensive operating force.

Astonishing little common sense and less knowledge of the simplest laws of optics are displayed in the design of footlamps, border lamps and bunch lamps. In many cases it would seem that an attempt had been made to permit as little light as possible to escape from the confining metal surfaces and find its way to the scenery.

Color effects are most frequently purely accidental or empirical. Little or no study of the laws of color has been made, and the dyes used in dipping lamps and in preparing gelatines show no evidence of that thoroughgoing development necessary to produce the purest possible color values with the minimum loss of light.

Apparently the relationship between color in light and the color of the dyes and pigments used in coloring scenery has been ignored. Nor has any attention been given to the production of the finer color tints and shadings in light by the method of color mixture.

In view of the results of the enormous amount of research work in color and light that has been done in the last decade, there is no excuse for the existence of such conditions as those so far touched upon. It is time that the stage artist should wake up to the unlimited possibilities of color and distribution of intensity in stage-lighting effects.

The work done abroad by one or two advanced workers in the art of the stage is a step in the right direction, but their devices are still crude and inefficient. However, it is evident that these workers have realized that the limit of the production of beautiful stage effects is spelled l-i-g-h-t quite as often as s-c-e-n-e-r-y.

But there is more in stage lighting than mere color and intensity. Light as an artistic medium has its tempo, its nuances, its timbre, its tone, precisely as is the case with sound. Just as sounds of various purity, intensity and tone may be combined into a concordance that has expression or meaning, so light varying in purity, intensity, color and distribution can be a means of arousing the sense of beauty. Surfaces may be so illuminated that their appearance is profoundly altered, and this adds to the stage artist's equipment in that he can introduce still further secondary variations into his light play by the proper use of color, surface characteristics, translucency and absorption in the lighted areas. Moreover, he has at his command a mobile element. His light play is not static. A sequence of colors or intensities or a changing pattern of light masses may or may not be beautiful, depending upon the skill with which the effects are handled.

It is possible indeed to produce on a suitable ground by the aid of colored light properly controlled a succession of color arrangements that have quite as much appeal to the sense of beauty as analogous arrangements of sounds. That such has been appreciated as a fact is evidenced by the several more or less monumental and quite futile attempts that have been made to draw parallels between color and music and even to supplement one by the other.

The failure of these attempts has been due, first, to the mistaken idea that there is any parallel between the technique of music and the technique of color, and, second, to the attempt to subordinate the color to the music. Color makes the strongest and most immediate sensuous appeal, and its appeal being of an entirely different order the two clash unless both are attuned to the same ideal. Thus, from the beginning any attempt to employ a mere sequence of colors as a further extension of an orchestra is doomed to failure. The attempt to tag each musical note or key with a color name is quite

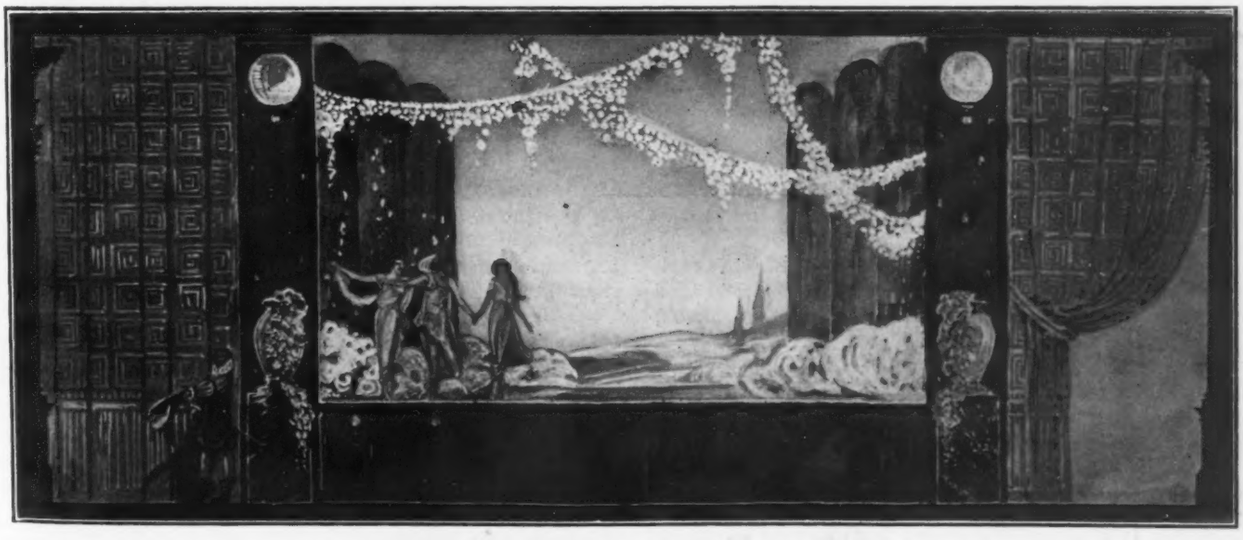


FIG. 1—SCENE 1, "THE DISPUTE OF THE MUSES"

futile, and only serves to illustrate the would-be composer's entire misconception of the art of color. Color follows no scale even remotely similar to the musical intervals, and such namable esthetic characters as color may be said to possess have no such physical basis as musical tones, keys and harmony. Equal justification might be found for an attempt to give interval key and harmony to the technique of the draftsman.

Therefore in what follows any use of musical terms as related to color must be understood as analogy and justified only by the common nature of the esthetic idea to which all forms of art must appeal.

The color play is a symphony in itself and must be treated as such. The devices to produce it constitute an orchestra—not a single instrument. The various forms, phases and simultaneous incidents in the color play must be orchestrated so as to form a complete harmonious whole.

The ideas capable of this form of presentation are not musical, although music and color may be woven together in order to express ideas that one alone cannot interpret. But whatever parallelism exists between the two media is pure analogy. The tempo of mobile color is not by any sort of necessity the same as musical tempo even when the two arts are co-ordinated. Indeed, they may be widely different. Thus, in swift accelerando, nature plays her silver flute against the cool and quiet moonlight, and sleeps at highest noon. Yet how much the moonlight lacks without the nightingale!

> "Hark, hark, the lark at Heaven's gate sings,
> And Phœbus 'gins arise."

So faint a trill across the powerful crescendo of the sunrise! The carol uttered by a tiny throat tempers to melody the brasses of the dawn.

So nature gives her lesson. And man derives from it an "effect"—a mechanic's universe—a halting moon, a luminous disk of glass against a canvas sky—a purple dawn—a ribald sunset! He strives for the impossible and fails to catch the note of beauty, the harmony, the spirit that lies behind the scenes.

The art of the dance—of pure movement—is quite as closely allied to mobile color as is music. A combination of the three may easily be the means of expressing more completely the artist's feeling for beauty.

Mobile color may also ally itself with painting, for here again both together may express ideas that neither by itself can convey. The painter can suggest movement and no more. Mobile color can make this movement real. The pigmented canvas is but a moment of the artist's thought—a fleeting glimpse of all that was and that is yet to be. Add mobility to this cross-section and the fuller story may be told. These successions of beauties may be woven together, and instead of one chord an orchestrated theme may be developed.

Thus the stage artist has at hand a means of expressing a new note in beauty. The skill of the draftsman, the skill of the musician, the skill of the dancer, the skill of the colorist must meet in him, nor shall the least pliable of these be the work of the colorist.

We are to-day, in the art of mobile color, like the early Greek shepherd who, beside some sylvan brook and little dreaming of the wonders of the Wagnerian orchestra, piped his simple reed.

Some few years ago (in 1910) I had the opportunity to put some ideas on the subject of mobile color into practice. The results and the devices were simple in the extreme—so much so that it was not possible to convince others that there was more than a somewhat easy improvement in stage-lighting methods and equipment. However, the germ was there, and continued study led to the belief that the method had unlimited possibilities.

The next step in the development was marked by the great Venetian ball given by the Society of Ecole des Beaux Arts Architects in 1913, when the attempt to paint the spectacle with light was carried out literally. This current year (1915), and in co-operation with Mr. Howard Greenley, the result of two years' additional studies and experience was incorporated in the setting for a classic pantomime, "The Dispute of the Muses," in which mobile color was used as a background for dances. This result proved that "mobile color" is not only a possibility—it is a practical achievement. By the proper co-ordination of suitable lighting devices with scenery material, pigments and dyes the most elaborate color play can be produced, and with no very great difficulties.

Mr. Greenley's design for the setting of Scene 1 is shown in Fig. 1. It presents a grove on the slopes of Mount Ida where Juno meets the Muses in conclave to decide which is the most beautiful. A plan of the set is shown in Fig. 2. The sides of the stage are banked with cedars. Across the back, a hedgerow masking; in front, Juno's throne. The background is a canvas "drop" dyed light blue. Spaced 2.5 ft. down the stage hangs a pale gray-green gauze drop with hexagonal ⅛-in. mesh. The head room being low, the end of the barrel-vaulted ballroom ceiling was used as a sky dome to carry out the deception of continued open sky. Normally a double cyclorama of canvas and gauze carried well up into the scenery loft would have answered the purpose. In order to conceal the joint between the back drop and the ceiling it was necessary to bridge over the back with greens and garlands in a manner somewhat different from that shown in Fig. 1.

On the floor between the two drops were placed two single strips of the type to be hereinafter described and one three-part strip with louvers to prevent a total mixture of all colors used. The two single strips gave a general illumination of the entire back and served to desaturate the color tones introduced by the three-part strip. The two single strips alone gave the appearance of open sky due to the deceptive character of the drop combination. The blue of the back is slightly paled by the green of the auxiliary drop, while the semi-transparency of the auxiliary drop entirely deceives the eye as to distance.

When color was added by the three-part strip this color appeared to float in space behind the dancers. These colors could be made to appear either as mere masses growing from the horizon, continually changing in hue and intensity, or as striations of hue melting into one another and into the basic tone established. Further variations could have been produced by complicating the equipment, but time and limited facilities forbade.

Thus color growths can be established from several directions, including growing and dissolving color masses of varying configuration, and in the handling of such effects lies the technique of the art.

The stage proper and the dancers were illuminated by two parabolic flood lamps set front near the top of the proscenium arch, the central beams of light crossing mid-stage. Use was made of amber and blue of such quality that the high lights on the drapery folds would receive synthetic white light, the turns of the folds being rich in soft colors, for which effects the materials were happily selected as to hue and texture. The light of the footlamps was subdued, and only rich colors were used—red, amber and blue. The only "white" on the stage came from a lens incandescent spot lamp hung above and a little in front of Juno's throne. The light from this lamp filtered down to the throne through garlands of yellow and white roses and served to accent both the throne and its occupant against the colorful background.

The sky dome above was lighted by a single "basket" of the form described hereafter, using a pale blue-green color filter. This furnished all the general illumination required.

On the rising of the curtain the Muses were beheld frozen in tableaus—the only tone was a frigid pale-blue green in which all the delicate tones of the figures' draperies were lost—not even the faces showing color. The scene was lifeless. In feeling the background was like ice. Light filtered through it from far off, like the dawn through a luminous mist. Then slowly it melted. A rosy tint appeared. It brightened. Across its center revolved a faint bar of greenish gold from which the green faded as a flush of rose slowly mounted to meet it. Down below was a band of deepest blue. And, as the colors slowly came to life, so did the figures. Over Juno's throne, against the whitening back, a pale rainbow figure floated. Then, as the colors gathered strength, so did the dancers. And with each movement

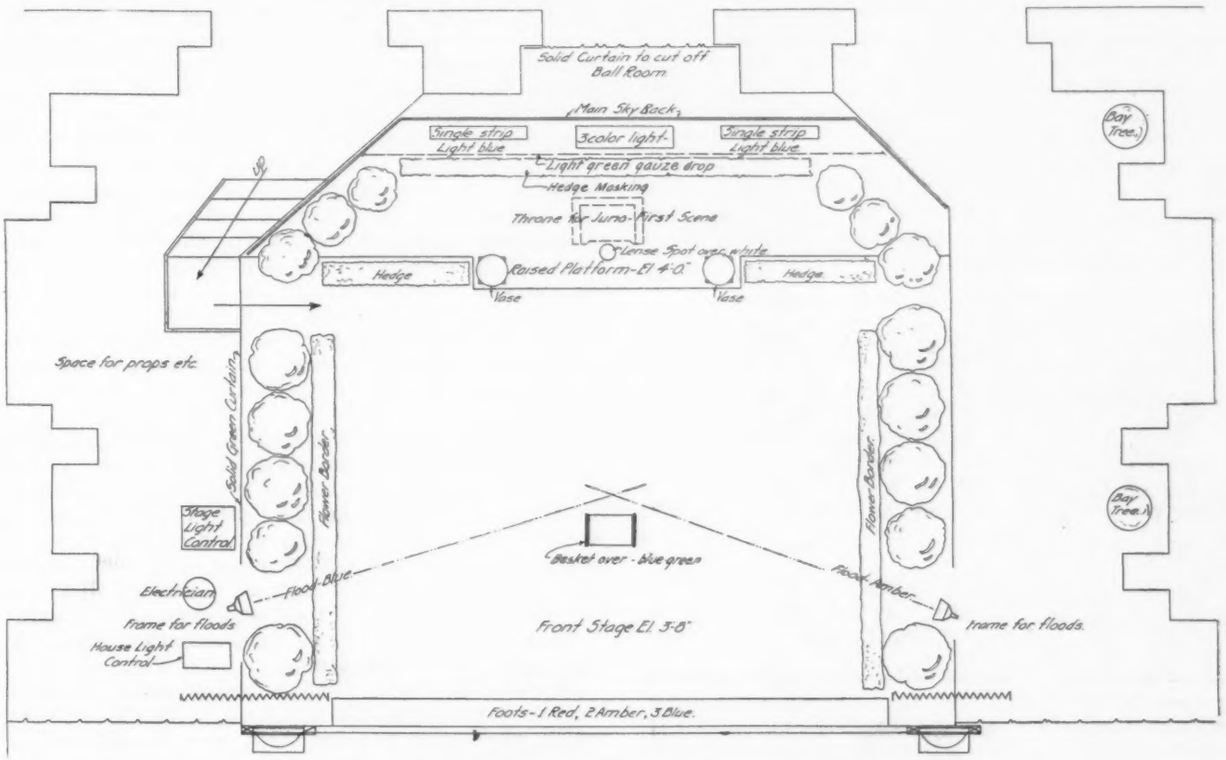


FIG. 2—PLAN OF FIRST SET—SCENE 1, "THE DISPUTE OF THE MUSES"

the opalescent draperies changed in hue and tone. As a dancer came down stage her flowing garments caught the deeper light tones from the footlamps and were enriched. Again a figure flashed bright, then faded either to dull rose or pale blue as she passed left or right. The quality was of the pastel, again of the tinted mezzo.

With Juno's coming—the sun. The scene was set against a gray-blue sky, and everything was bathed in silvery gold, not harsh, but as of sunlight filtered by a moistened atmosphere. The pale beams of the sun rising above distant Olympus struck across to Juno's throne and bade her make the momentous decision.

Preliminary Work

When the problem of stage lighting and mobile color was first approached it was determined that if the solution were to be useful the equipment required must be practical and adapted to ordinary stage usage. It must be reasonably low in cost.

All ideas of complicated "color organs" were discarded in favor of a simple switchboard and hand-operated dimmer equipment. The effects must be produced by simple means. The stage electrician is not an artist. Therefore, the problem was to produce an illuminating equipment that was economical in its use of light, flexible and easily transportable, easy to set up and simple to operate. The equipment must, at the same time, be capable of producing the most complicated color effects without more than necessary complication in the apparatus. The devices must be such as to permit the greatest possible variation in direction, distribution and intensity of light with a minimum of operators. The equipment must be such that the fewest number of devices would be useful for the largest possible number of effects. Thus the cost to manufacture would be reduced and the equipment of road companies simplified. As a matter of fact, one equipment now in use on the road is set up and handled by a single electrician. No single complete piece of apparatus or unit should be larger or heavier than could be easily handled by a single stage hand. The equipment must be rugged in construction, employ no detachable parts that could not be purchased in any hardware store, and require no attention when once set up. No arc lamps were to be used.

The first step in the solution of the problem was the selection of a proper type of lamp. The tungsten lamp had just made its commercial appearance, but its use on the stage was limited by the fragility of its filament. Furthermore, its life was greatly reduced by dipping in dyes, owing to the consequent high temperature of the bulb when in use.

This question was discussed with the engineers of the Harrison Lamp Works of the General Electric Company, who finally consented to manufacture experimentally a large form of condensed filament now known as the concentrated filament. These lamps were first made in two ratings, 100 watts and 300 watts,

the first to replace the usual foot and border lamps and the second to replace the arc lamps. These lamps are now available commercially in ratings up to 1000 watts and over, but for stage lighting the 100-watt, the 300-watt and 400-watt sizes have proved the most useful.

The concentrated filament furnished a light source of practically arc crater dimensions, but radiated its light almost equally in all directions. The "point source" of light being achieved, accurate reflector design was a relatively simple matter, the designs being such as would economically distribute, on the scenery surfaces, all or nearly all of the light generated by the lamp. Thus the cost of electric energy would be low.

The lamp and reflector problem being solved, the next question was that of color. The dipping of lamps in dye solutions being injurious to the lamp and impracticable, it was decided to employ color filters. Spectro-photometric studies of commercial gelatine color filters made it evident that only a few were serviceable, and a research was undertaken with the purpose of producing accurate color in both glass and gelatines. The selected results of this investigation were standardized to serve as standards for all future work. Correlated studies were made in the color of pigments, paints and dyes for scenery and dress materials and in powders and paints for "make-up." The result was a complete line of data that made it possible to select the most useful pigments, dyes and color filters that would produce any desired color tone. This work served as a foundation for the standardization of stage-lighting equipments.

General Features of the Equipment

The devices are designed on the unit basis. For each type a unit has been selected that can be easily handled by one man and that will, when acting as a part of a group of such units, lend the maximum flexibility to the group. The group can, therefore, be arranged in a variety of ways to meet different conditions. Thus a number of the strip-light units can be assembled together for border service and the several units can be so adjusted as to light different parts of the drop differently.

The lighting of a cyclorama represented an unsolved problem until the unit idea was introduced. At the same time the number of different units has been kept

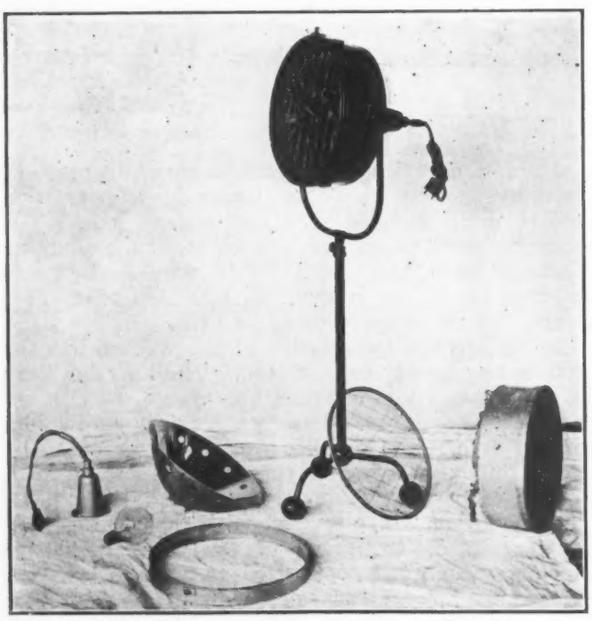


FIG. 3—THE PARABOLIC SPOT AND FLOOD LAMP

FIG. 4—SPOT AND FLOOD LAMP

a minimum by so designing each unit that it can be adjusted to produce a number of different effects. As far as possible the parts of the different units are made interchangeable. The simplicity of the system requires simple wiring, which can easily be made portable, and simple switching and dimming devices.

Eight units are now included in the system. These are the combined parabolic spot and flood lamp, the basket, the lens spot, the pistol spot, the elliptic border, the parabolic strip, the footlamp unit and the color-mixing unit. The reflectors used are of hard brass drawn and spun to accurate templet and are heavily nickel-plated, after which they are given a special treatment to preserve their reflecting power. Each reflector is specially designed to produce an accurately determined distribution of light and so as to make use of the largest possible amount of light emitted by the lamp. In this way the light is properly distributed on the surfaces to be illuminated, resulting in the use of a much smaller amount of light for the same effect than is the case with the usual stage-lighting devices. The greatest economy is therefore obtained, as the light is not wasted. The cost of electricity is correspondingly reduced.

For certain effects use is made of diffusing reflectors with high-efficiency aluminized surfaces, but generally, when possible, the use of nickel-plated reflectors for diffusing or spreading the light is recommended in preference to white, painted or aluminized surfaces, as the distribution of light is better controlled and the efficiency is considerably higher. Some of these reflectors have seen service through two road seasons of forty weeks each with no more attention than ordinary wiping with soft flannel.

As explained above, all of the reflectors are designed for the concentrated-filament lamps, which are now readily procurable and are much more rugged and of higher efficiency than the standard lamps with hairpin-loop filaments. The construction of the units is very rugged and adapted for rough usage.

The Spot and Flood Lamp.—In the usual arc spot lamp use is made of not more than one-quarter of the light emitted by the arc crater. The lamp is unsteady, requires constant attention, is heavy, expensive, constitutes a fire hazard, and is distinctly limited in use. Furthermore, the light from the arc is lacking in warmth and produces hard shadows and sharp high lights with consequent distortion. The quantity of light emitted by the arc is materially less when the source of supply is an alternating-current circuit than when direct current is available. Furthermore, the adjustment is different under the two conditions, and while a definite crater is formed on one electrode when direct current is used, which crater can be made partially to face the lens by angle feeding, when alternating current is used no such prominent crater is formed. The inherent singing noise of the alternating-current arc is disagreeable and, if many such spots are used simultaneously, may become a positive nuisance.

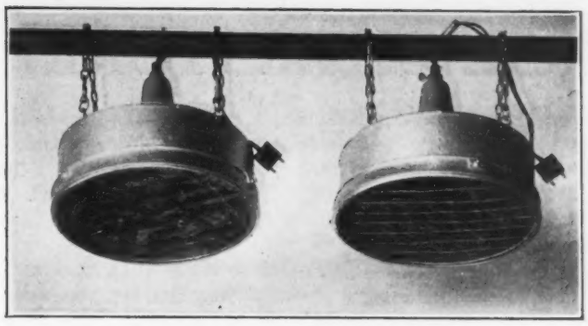


FIG. 5—SPOT AND FLOOD LAMP

Owing to the different rates at which the positive and negative electrodes are consumed with a consequent continual traveling of the arc out of focus, some form of mechanical hand feed is required. The form of this feed must be different for alternating and direct current. The parabolic spot and flood lamp first substituted by the author for the lens arc spot is shown in Fig. 3. It consists of a rugged casing and stand, the casing containing a spun-metal reflector of accurate design, parabolic or elliptic for flood only. The parabolic mirror is most generally useful when employed as a spot or flood, and the aluminized reflector when a generally diffused light is needed. This unit is also employed with combined spherical and parabolic zonal reflectors with auxiliary parabolic zonal reflectors for special purposes. Concentric louvers, either absorbent or in the form of confocal parabolic reflecting segments, are used with this unit when employed as a gallery spot or flood lamp. When so used the casing is provided with slide castings to hold the color holder and louvers so that they can be readily changed independently of one another. The ring holder shown in Fig. 3 is then dispensed with.

The unit is designed for the 300-watt or 400-watt concentrated-filament lamp and has focusing adjustment. At 30 ft. distance the central spot can be reduced to a diameter of 4 ft., while the surrounding area of lower intensity prevents the appearance of the sharp shadows procured by the arc spot. The central light spot may be spread so that two of these units in the gallery will illuminate an entire proscenium arch 40 ft. wide.

Color filter holders are provided with cross wires to keep the gelatine flat. Paper fasteners are used to hold the gelatine. For use as an overhead flood or border unit the casing is provided with chains and halter hooks so that one more may be hung from a batten, as shown in Figs. 4 and 5.

Seventy per cent of the light emitted by the lamp is received on the principal mirror, so that with a 400-watt lamp more light is projected on the stage than from a 550-watt arc spot.

When hung from a batten well up under the gridiron and used with diffusing reflectors these spot lamps will produce on a dyed canvas and gauze cyclorama effects identical with the so-called German sky dome. Several of these spot lamps provided with different color filters on different dimmer circuits may be used, in conjunction with the "canned sunset" described hereinafter, to produce the most marvelous color changes.

Being easily transportable and adjustable the spot lamps may be used for a multiplication of effects, and provide a large source of light that may be hung in the scenery loft and still meet the fire laws.

The unit is designed particularly for use with the gas-filled lamp and adequate ventilation is provided.

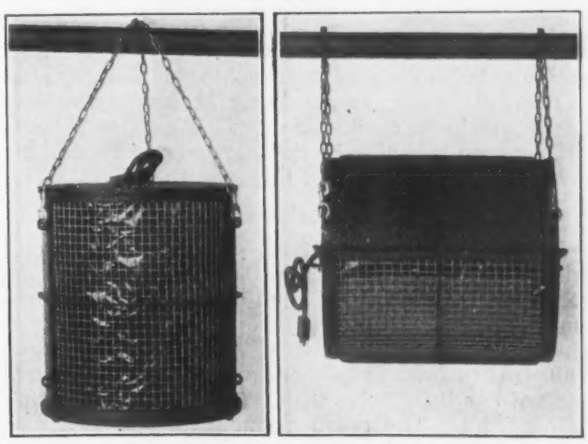
The basket unit—shown in Fig. 6—consists of a cylindrical wire-mesh box with sheet-metal top and double sides and bottom of ¾-in. mesh No. 14 galvanized wire, with angle reinforcement. A mogul socket is mounted at the center of the top and stage cable brought out through a bushing. The outer mesh layer is in two hinged semi-cylinders hooked together. The outer bottom slips over the inner bottom and is securely held by the bottom angle of the outer cylinder.

The basket will take a 1000-watt gas-filled lamp and may be hung from battens or by lines in the scenery loft. When thus equipped this unit will furnish ample general lighting. It can be dimmed as desired. Excellent moonlight effects can be produced by using one of the units equipped with blue-green gelatine, together with one parabolic spot lamp equipped with a light-blue gelatine properly directed to accent the high lights. The two units can be dimmed separately. In addition to the above arrangement, the basket is made with one side semi-cylinder of sheet metal aluminized on its inner surface as shown in Fig. 7. These baskets may be hung on battens and used in place of the parabolic spot lamps for lighting cycloramas, as shown in Fig. 5, but have to be hung so that the solid parts do not throw shadows on the scenery.

The Elliptic Border.—This unit is made only for the 100-watt concentrated-filament lamp. The reflector is a semi-ellipsoid (a semi-ellipse in section), and makes useful nearly all of the light emitted by the lamp. The use of an elliptic reflector makes it possible to design the unit within small dimensions. Its diameter is 10 in., so that it takes the place of the usual baby spot lamp when used at a wide angle, but has a much higher efficiency. It is, in effect, a very efficient bunch lamp of small dimensions.

If desired, these units may be mounted on a batten to form a very efficient border light source. The construction used makes it impossible to bring the reflector focus too close to scenery or other inflammable objects. The effect of the elliptic reflector is practically to transfer the luminous source or lamp filament to a point in front of the color screen. At this focus there is radiated about 70 per cent of the light emitted by the lamp, less the absorption of the color filter, through only one hemisphere, so that all of the light is thrown toward the scenery. A similar effect would be produced if the lamps were backed by hemispherical reflectors, but in this case hemispherical color screens would have to be used while the elliptic reflector makes flat color screens possible without color interference, owing to part of the light from one lamp passing through the color screen of the next lamp.

In the next installment there will be described the parabolic strip, the lens spot lamp, the color-mixing strip and the "footlight" unit, and specifications will be given for lamps for use in stage lighting.



FIGS. 6 AND 7—THE BASKET UNIT

DIGEST OF ELECTRICAL LITERATURE

Generators, Motors and Transformers

Currents Induced in the Shafts of Dynamo-Electric Machines.—PAUL GIRAULT.—A full analysis of the currents induced in the shafts of dynamo-electric machines. There are two kinds of such induced currents, direct current (which has not been studied by former investigators) and alternating current. The direct current is due to the fact that the primary and secondary windings produce magnetic fluxes parallel to the shaft of the machine. In revolving through these fluxes, the rotor behaves like a Faraday disk revolving in a field perpendicular to its plane. Electromotive forces are thereby induced in a radial direction, but their value is different according to the section of the rotor under consideration. Hence if two points of the rotor periphery belonging to different sections are connected together, a current will flow through the connecting circuit. The pedestals and the base of the machine form such a circuit, which is closed through the shaft of the machine. The alternating currents induced in the machine shaft have another origin; they are due to the lack of symmetry of the magnetic fluxes with respect to the center of rotation. The mathematical theory of the subject is fully given.—*Bulletin de la Soc. Internat. des Elec.*, Sec. III, Vol. 5, pages 45 and 127; abstracted at length with illustrations in *La Revue Elec.*, April 2 (published June 25, 1915).

Flux and Magnetizing-Current Waves.—A. L. TACKLEY.—A discussion illustrated by diagrams of the mathematical relationship between flux and magnetizing-current waves at normal flux densities and also in greater detail at high flux densities.—London *Electrician*, July 9, 1915.

Lamps and Lighting

Half-Watt Lamps in Great Britain.—An article on new sizes of half-watt lamps available in Great Britain. At 25 volts half-watt lamps of 15 watts to 100 watts are now available. In the 50-volt to 65-volt lamps, of which the smallest size of half-watt lamps has hitherto been 100 watts, 30-watt and 60-watt lamps are now obtainable. For 100 volts to 130 volts there are two new sizes, namely, 60 watts and 100 watts, measuring about 5⅛ in. by 3 in. and 6¾ in. by 4 in. respectively, and both with bayonet caps. For 200 volts to 255 volts the new sizes listed are 100, 150 and 200 watts. Of these only the 100-watt size is fitted with bayonet caps, the two larger sizes having Edison screw caps. The 100-watt and 150-watt, 200-volt lamps measure about 6¾ in. by 4 in., and the 200-watt lamps 8⅛ in. by 4¾ in. The dimensions vary to some extent, according to the different makes of lamps. The candle-powers may be taken roughly at twice the watt ratings. In the 100-watt sizes the filaments are in an absolutely horizontal plane, so that the maximum candle-power will be vertically downward. Argon is said to be the inert gas used for filling these lamps.—London *Elec. Eng'ing*, July 8, 1915.

Generation, Transmission and Distribution

Water-Powers of Switzerland.—Statistical tables prepared by L. W. Collet show that there are in Switzerland 794 water-power plants with an output rating of more than 20 hp. each. Their minimum aggregate rating is 305,548 hp., and the maximum 775,470 hp., the mean being 478,916 hp. Then there are 6005 plants with a rating of less than 20 hp. each. Their aggregate rating is 37,817 hp. The mean power available in Swiss water-power plants is therefore little more than 500,000 hp. But far more power could be developed. The minimum power could be increased to 884,060 hp., while 1,402,770 hp. would be available during nine months of the year, 2,557,047 hp. during six months, and with the aid of storage reservoirs 2,225,600 hp. during the whole year.—*La Revue Elec.*, Feb. 19, 1915 (published May 14, 1915).

Magnetic Chucks.—JOSEPH HORNER.—In a continuation of his long illustrated serial on grinding machines, the author discusses the design and construction of magnetic chucks and their holding power. The principal types of design are described and illustrated.—London *Engineering*, July 2, 1915.

Installations, Systems and Appliances

Derby.—An illustrated review of the developments of the Derby electricity undertaking. The municipal electricity supply of Derby dates back to 1894, when a single-phase supply, one of the earliest in the country, was put down with a number of very small units. Between 1898 and 1901 three 600-kw. flywheel generators were installed. In 1904, when an extensive tramway system was laid down, a three-wire, direct-current network was laid in the main shopping area. The plant laid down for the dual purpose consisted of four direct-current sets, one of 500 kw. and three of 300 kw. Owing to the extremely rapid rise in the demand for energy for all purposes a new station became necessary, and the first installment, consisting of three 750-kw. direct-current sets, which could be used both for lighting and traction purposes, was put into commission in 1908. It was still found necessary, however, to operate the original station for the single-phase supply, and a reconstruction was recently decided upon which would permit of the shutting down of the old station for the greater portion of the year. The committee has accordingly installed two 2500-kva. turbo-alternators and two additional boilers. These units are designed to run at 3000 r.p.m. and are of the impulse reaction type. The steam consumption at full load is 14 lb. per kilowatt-hour. Surface condensers are used, and each plant is fitted with a water recorder for continuous observation of the efficiency. The alternators are three-phase, fifty-cycle, 6600-volt machines. A rotary converter of 500 kw., to deal with the traction load, and two 750-kw. motor-alternators have been installed in the old engine room, the latter to supply the single-phase demand, which is still of considerable proportions. There are also two rotary converters, which are now used as a stand-by, but which have been run to obtain direct current from three-phase for the last three years. The total rating of the two stations is now about 9500 kw., and the present site will provide ample room for more than double the plant installed. The distribution system measures some 9 miles across.—London *Electrician*, June 18, 1915.

Electrophysics and Magnetism

Laws of Induction.—A long letter by R. G. Jakeman, who thinks the best statement of the law is as follows: "An electromotive force is generated in a closed circuit when the number of magnetic lines which cross the latter is changed." The application of this general law to four different cases, including Blondel's recent experiments, is mathematically discussed. The author finally agrees that the conception of an electromotive force being induced by a conductor cutting a flux is a very useful one, but since it fails completely in the case of the single-phase transformer, it cannot be considered general. Moreover, it has to be very carefully used

when dealing with short-pitch coils. There is also a brief letter by B. Davies on a mathematical point in connection with Robertson's recent communication.—London *Electrician*, June 25, 1915. A second letter by B. Davies is published in London *Electrician*, July 9, 1915.

Electricity of Rain.—G. C. SIMPSON.—The author first sums up the firmly established facts concerning the electricity of atmospheric precipitation. As to non-thunderstorm rain, the facts are: The rain is sometimes positively and sometimes negatively charged; about 90 per cent of the rain is positively charged; the normal potential gradient is nearly always reversed during the rain. Concerning thunderstorm precipitation the facts are: The precipitation is sometimes positively and sometimes negatively charged; more positive than negative electricity is brought down by the precipitation; the charges per unit mass of the precipitation and the vertical electrical currents produced by its falls are much larger than with non-thunderstorm rain; the potential gradient undergoes large and rapid changes of sign, and on the whole the potential gradient is more often reversed than not. Finally, concerning snow the facts are: Snow is sometimes positively and sometimes negatively charged; in Simla positive electricity was in excess, while in Potsdam an excess of negative electricity was observed; a given weight of snow may be more highly charged than the same amount of rain, even in a thunderstorm; high values of the potential gradient, both positive and negative, occur during snowfall. The author discusses two theories which have been proposed for explanation—first, the influence theory of Elster and Geitel, which he considers untenable, and, second, his own "breaking-drop" theory. This theory is founded on the observed fact that when a drop of water is broken up into smaller drops the water becomes positively charged and the air negatively charged. If there is any large amount of breaking of drops there is bound to be a large separation of electricity. In thunderstorms, which are known to have associated with them violent ascending currents of air, there is no doubt that the water-drops are much broken, and all the chief electrical phenomena of thunderstorms can be accounted for by this theory.—*Philos. Mag.*, July, 1915.

Electrochemistry and Batteries

Electric Furnace for Gold Refining.—W. P. LASS.—The gold precipitate from the zinc-dust presses in the cyanide plant of the Alaska-Treadwell Mining Company, Treadwell, Alaska, is treated in the refinery adjoining by the Tavener or lead-smelting method. About 3 or 4 tons of this precipitate are produced monthly having a gold assay value of $40,000 to $60,000 per ton. It was formerly the practice to treat the by-products from this process, consisting of 2 tons of slag, 300 lb. of matte, 500 lb. of refinery refuse, flue dust, etc., in a 24-in. water-jacketed blast furnace. Last year, however, a plain single-phase electric furnace was substituted for the blast furnace. The furnace was constructed from an old steel acid drum by cutting off the top and introducing a cable, made from strands of bare copper wire, through the bottom and spreading the strands out fan-shaped on the inside of the drum. Powdered graphite, obtained by grinding up old crucibles, mixed with 10 per cent cement, was tamped wet into the bottom of the drum, around and completely covering the copper wires. The graphite was carried up to the bottom of the furnace, or lead-well, and acted as the lower electrode. The sides were built up of ordinary firebrick. The upper electrode is made of graphite or carbon. The furnace is operated on the lighting circuit through a 50-kw., sixty-cycle, 110-volt transformer. In starting, the furnace is operated as an arc furnace. When it gets hot the charge is added, through the top around the electrode, and the furnace acts as a resistance furnace. Its advantages over the blast furnace are the saving in mechanical loss of gold in flue dust, the obtaining of a lower grade of slag free from shot, the nicety of regulation of the melting temperature, and the benefit to the general health of the operators.—*Bull. Amer. Inst. Min. Engineers*, July, 1915.

Dry-Battery Electrolytes.—A note stating that the shortage of flour in Germany has necessitated the use of substitutes for the wheat or rye flour commonly used for thickening the electrolyte in dry batteries for pocket lamps. The following materials are recommended for this purpose: glass-wool, sawdust, gelatine, starch, kieselguhr and water-glass. The following instructions are given for compounding the electrolyte: 140 grams of well-powdered salammoniac, 40 grams of zinc chloride and 10 grams of ammonium sulphate are mixed together in a porcelain bowl with 10 grams of thick refined glycerine. The mixture is then covered in small quantities with distilled water at a temperature of 40 deg. C. and energetically stirred until the materials are dissolved into a concentrated solution. This mixture is allowed to soak into the binding material, and the paste so formed is filled into the cells, which are closed with a paraffined card top sealed with bottle wax. In the cover two small glass tubes are provided for the escape of such gases as are generated within the cell. In compounding the electrolyte, calcium acetate can be mixed with advantage with equal parts of the salammoniac. Such a solution possesses excellent conductivity, is hygroscopic, and does not crystallize or creep.—London *Electrician*, June 18, 1915.

Dry Cells.—Under the heading "A New British Industry," a brief and somewhat general sketch is given of the manufacture of dry cells.—London *Elec. Review*, July 9, 1915.

Units, Measurements and Instruments

Modified Variable Condenser for Use with Quadrant Electrometer.—HARRY CLARK.—In the use of the quadrant electrometer to measure very small currents the best results are obtained by the use of a compensation method, in which the current to be measured is neutralized by an equal current of opposite sign produced

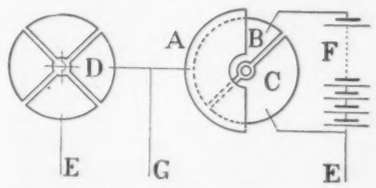


FIG. 1—MODIFIED VARIABLE CONDENSER FOR USE WITH QUADRANT ELECTROMETER

in such a way that its value may be calculated. The balancing current is obtained by the author by a modified variable condenser method which consists essentially in the use of two variable condensers. One terminal of each condenser is connected to the insulated quadrants of the electrometer, the other terminals being maintained at potentials V and zero respectively. The entire compensation current is produced by varying the capacity of the first condenser. If the second is varied at such a rate that the sum of the two capacities remains constant, the sensitivity of the apparatus will not be changed. As used by the author these two condensers are combined into a single instrument indicated in Fig. 1. The fixed plates at A serve as a common electrode for both capacities and communicate with the electrometer D and the source G of the unknown current. The movable piles of semi-circular plates B and

C, though rigidly mounted on the same support and constrained to rotate together, are insulated from each other. B is kept at any desired potential by means of a battery F, while C is put to earth.—*Phys. Review*, July, 1915.

Zero Method with Photo-Electric Cells.—F. K. RICHTMYER.—An abstract of an American Physical Society paper. For certain laboratory purposes where light-sensitive devices of extreme sensitivity are desirable photo-electric cells of sodium or potassium offer exceptional possibilities. At present the use of such cells as are ordinarily obtainable on the market is somewhat limited by the so-called "dark current." This dark current can be eliminated as follows: e_1 and e_2 (Fig. 2)

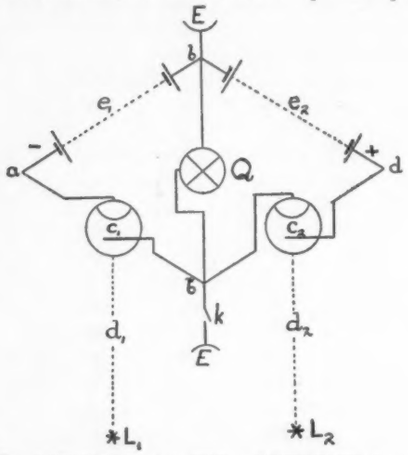


FIG. 2—WIRING PLAN FOR DIFFERENTIAL PHOTO-ELECTRIC PHOTOMETER

are sources of potential difference, which can be varied independently at will from 0 to 120 volts. The — terminal of e_1 and the + terminal of e_2 are connected, in a sort of Wheatstone bridge arrangement to the photo-electric cells c_1 and c_2 respectively. Points b and b' are connected by a sensitive Dolezalac electrometer, and are also grounded, b', through a suitable make-and-break key k. Relative values of e_1 and e_2 may by trial be so chosen that the dark current through c_1 should be equal to that through c_2, as shown by the null reading of the electrometer when k is open. If now c_1 and c_2 be illuminated by sources L_1 and L_2 at distances d_1 and d_2 respectively, either d_1 or d_2 may be so adjusted that the resultant photo-electric currents are equal, as is again shown by the null reading of the electrometer. This adjustment may be made with a very high degree of precision, even with the simple cells obtainable on the market. One might call such an arrangement a "differential photo-electric photometer," since the sensitivity is limited only by the absolute difference (photo-electrically measured) in the two illuminations, and not by their relative difference, as is the case with visual photometers. In fact, such an arrangement is to light measurements what the Wheatstone bridge is to resistance measurements. For various positions of L_1 there are corresponding positions of L_2 for a "balance." Some figures are given which show the precision attainable.—*Phys. Review*, July, 1915.

Telegraphy, Telephony and Signals

Production and Amplification of Continuous Oscillations.—A note on three recent British patents (Nos. 13,247, 1914; 13,248, 1914; 6476, 1915) of Marconi's Wireless Telegraph Company and H. J. Round. The first of these describes an improved form of vacuum "oscillation valve" tube, which can be used either for magnifying or for producing continuous oscillations for wireless telephony or telegraphy. The tube contains a heated cathode and an anode, and has a constricted portion, to which an external metallic coating is applied, taking the place of a grid or screen within the tube. An electromagnet adjacent to the constricted portion also acts on the discharge. The second specification describes a scheme for using such a tube for the production of continuous oscillations, the special feature of which is the insertion of a condenser in the circuit of the coating or screen, shunted by a high-resistance and potentiometer arrangement to increase the stability of the valve. The last patent specifies the use of a cathode in the form of a tube of platinum coated with lime heated by an internal carbon filament.—London *Elec. Eng'ing*, June 24, 1915.

Miscellaneous

Russia.—An article giving statistical tables on the importation into Russia of products of the electrical industry from 1906 to 1913.—*La Lumière, Elec.*, May 29 and June 5, 1915.

Book Review

AUTOMATIC TELEPHONY. By Arthur Bessey Smith and Wilson Lee Campbell. New York: McGraw-Hill Book Company, Inc. 408 pages, 271 illus. Price, $4.

The widespread demand for a full exposition of the engineering principles of automatic and semi-automatic telephony, which has grown out of the ever-increasing use of those systems throughout the world, caused the authors to undertake the preparation of this volume. It is the first book to cover the field comprehensively and to describe fully the instruments, circuits and operating methods of the most important manufacturers. Chapter I covers a general study of trunking and is followed by full descriptions of the Automatic Electric Company's apparatus. Chapter IV is on measured service and prepayment stations, and Chapters V, VI and VII take up respectively the systems of the American Automatic Telephone Company, Siemens & Halske, and Lorimer. In the interesting section which follows are discussed reasons for loss of operating efficiency in manual offices and the help which may be secured from automatic traffic distributers and similar devices. The authors then proceed to plans for automatic district stations used with manual central offices, and to a treatment of the Clement automanual system. This is followed by a description of the Western Electric apparatus and a discussion of line equipment. Interconnection of manual and automatic offices and the supervisory and testing equipment of plants are then taken up. The book closes with chapters on traffic and development studies, in which are sketched the essentials and uses of these important parts of telephone engineering and their connection with automatic operation. As a whole the book represents an admirable treatise on the art and well repays careful study by the worker in this branch of telephony.

Books Received

Conservation of Water by Storage. By George F. Swain. New Haven: Yale University Press. 384 pages, 91 illus. Price, $3.

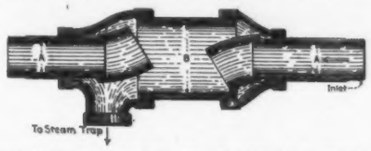
Secrets of German Progress. By Frank Koester. New York: The Fatherland Corporation. 306 pages, illus. Price, $1.25.

Single-Phase Electric Railways. By Edwin Austin. New York: D. Van Nostrand Company. 302 pages, 346 illus. Price, $5.

POWER AND OPERATING SECTION

Mechanical Means of Preventing Water Entering Steam Mains

To prevent water being carried out of small boilers it is necessary to minimize the velocity of issuing steam. This can be done by equipping the boilers with several steam outlets, each one as large as the steam main. When devices for removing entrained water from the steam are used they should be placed close to the boiler.



STEAM SEPARATOR MADE OF STANDARD PIPE FITTINGS

The accompanying illustration shows a steam separator which can be easily made from standard fittings. On the ends of the entering and outlet pipe are bends which compel a change in the direction of the steam with the consequent separation of entrained moisture. To provide sufficient room for the deflectors, the diameter of the separating chamber should be about twice that of the connecting pipes.

Arrangements for Conducting Tests on Water Turbines When Installed

In testing the efficiency of water turbines by the salt-solution and titration method it is important that the concentration of the "dosing" solution be maintained constant and properly mixed with the headrace water, and that the samples be so taken as to represent collectively the salt concentration in the tailrace. These problems have had careful consideration from the engineers in charge of the water-turbine tests at the Holtwood station of the Pennsylvania Water & Power Company.

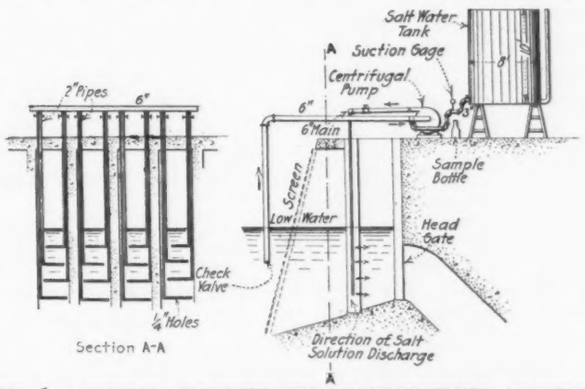


FIG. 1—METHOD OF INTRODUCING SALT SOLUTION AT HEADGATE OF WATER TURBINE DURING TEST

The accompanying illustrations show the manner in which the salt solution was fed into the headrace and how the samples were taken from the water which had passed through the water turbines. The centrifugal pump, which was driven by a compressed-air engine, sucked water from the headrace in front of the screens through a 6-in. pipe, at the same time drawing concentrated salt solution from the tank shown in Fig. 1. The salt solution was thus diluted to prevent the salt from clogging the perforated discharge pipe. The pump was regulated so that a constant vacuum was indicated at the suction gage, furnishing a uniform discharge of salt solution. The rate at which

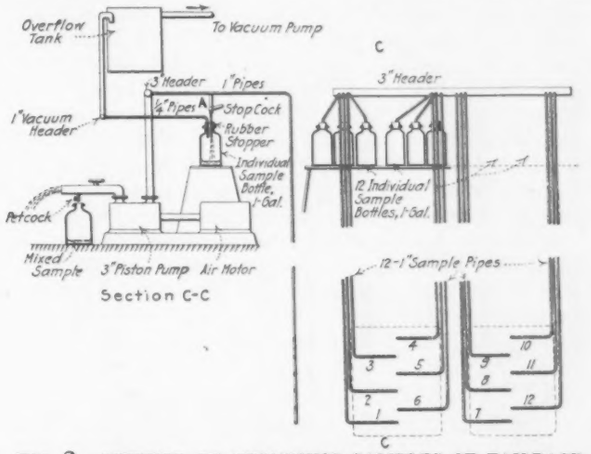


FIG. 2—METHOD OF OBTAINING SAMPLES OF TAILRACE WATER

the salt solution was fed to the water-turbine intake pipes was computed from periodical readings of a level gage on the supply tank. The sampling bottle shown in Fig. 1 just below a cock near the suction gage was used to determine periodically the concentration of the solution. A check valve was provided in the suction pipe of the pump to prevent a leak of the salt solution from this pipe.

To obtain the maximum expansion of air in the pump engines and still prevent freezing of moisture therein, the engine cylinders and discharge pipes were heated with a pipe-thawing transformer.

The arrangement of four 2-in. solution-distributing pipes fed by a 6-in. main as placed in front of each water intake is shown in section at the extreme left of Fig. 1. The lower ends of the pipes were equipped with laterals containing 0.25-in. holes arranged so that the solution was directed toward the headgate. Another system of perforated pipes was installed in the tailrace for drawing off samples of the diluted solution into separate bottles. As the pipes of the distributing and sampling systems terminated at different elevations, thoroughly mixed and representative samples were obtained, as shown in Fig. 2.

As an attempt was made to use not more than 4 tons of salt for each individual test, the concentration of the salt in samples taken from the tailrace water was not high. For this reason the samples to be used for analysis were boiled down to about one-fiftieth their volume. In the titration test potassium chromate was used as an indicator and a weak solution of silver nitrate was added drop by drop from a graduated burette until a brick-red precipitate started to appear, which indicated that all of the sodium had combined with the chlorine and that the silver nitrate was beginning to act on the potassium chromate to form silver chromate. The

burette was then read and the amount of silver nitrate used noted.

The following equation was employed to determine the water rate of the turbines: $Q = C_o q \div (C_2 - C_1)$, in which Q is the quantity of water discharged through the waterwheel in liters per second, q is the quantity of salt solution injected into the headrace in liters per second, C_o is the concentration of the salt solution used (average burette reading per liter), C_1 is the concentration of the unimpregnated headrace water (average burette reading per liter), and C_2 is the concentration of the tailrace water (average burette reading per liter). This means that the total amount of salt in the tailrace is equal to the amount that was originally in the river water plus the amount added during test.

During these tests the output of the generators was measured with carefully calibrated instruments, and as their efficiency at different loads had previously been determined by test, the efficiency of the water turbines was easily computed from the water rates and the hydraulic head. The output-efficiency curve thus determined has been found very valuable in determining the most economical load to be carried by each unit under various heads. It is claimed that this method of determining water rate costs only a fraction of the amount that other methods of water measurement involve. The units tested at Holtwood were rated at 10,000 kw. each. Mr. J. A. Walls is the chief engineer of the Pennsylvania Water & Power Company, and Messrs. A. Bang and George H. Spencer are the testing engineers.

Cost of Electric Service for a Town of 750

BY J. D. BOWLES

In Missouri there are fifty incorporated places of from 500 to 1000 inhabitants and four towns of over 1000 inhabitants which do not boast of an electric-service utility at the present time. There are also eighty-six incorporated places of from 500 to 1000 inhabitants, exclusive of the suburbs of St. Louis and Kansas City, in which electric service is furnished to the public. From these statistics it will be noted that all but a few of the cities in Missouri having more than 1000 inhabitants are furnished with electric service, but that 40 per cent of the cities of from 500 to 1000 inhabitants do not have electric service.

The following data, which are based largely on the writer's familiarity with the construction and operation of electric lighting systems in small Missouri towns, seem to indicate that a scientifically planned small-town lighting system, economically conducted, may present attractive possibilities to the average small-town investor who is able to devote a part of his time to the business affairs of the plant. A chain of such systems might prove attractive to an individual investor or a concern capable of furnishing the small plant with high-grade engineering and managerial service. The success of such small-town enterprises depends, however, largely on the public's enthusiasm and on its support.

TABLE I—ESTIMATED INCOMES*

Municipal street-lighting contract (twenty-five to thirty-five tungsten lamps)	$525
Contract with 100 commercial and residence customers (18,000 kw.-hr. at 12.5 cents)	2,250
Total receipts	$2,775

Assuming that there is a demand for electric service in a town of 750 inhabitants, it should be possible to obtain a street-lighting contract amounting to at least $500 per annum in addition to 100 contracts with private consumers. As shown in Table I, revenue amounting to $2,775 should be derived from such a city if energy were retailed at a block-type rate with a 15-cent maximum energy charge, an 11-cent minimum energy charge, and a one-dollar monthly minimum bill with a cash discount of 10 per cent.

TABLE II—ESTIMATED COST OF PHYSICAL PLANT*

Two oil engines and two 230-volt, three-phase, sixty-cycle generators	$2,400
Street-lighting and distribution system	2,500
Switchboard	300
Station site	250
Power house	350
Total	$5,800

The cost of a 230-volt, three-phase, sixty-cycle system supplied with energy by two 25-hp engines driving 15-kva generators, including all items, would be about $5,800, as shown in Table II. With 100 customers connected, the actual energy consumption would probably be about 18,000 kw-hr. Adding to this amount 6000 kw-hr. which would probably be used in the street-lighting system, it is seen that the total delivered energy would equal 24,000 kw-hr. The cost of producing this energy is shown in Table III.

TABLE III—ESTIMATED OPERATING OUTPUT AND EXPENSE*

Energy delivered to private customers (kw.-hr.)	18,000
Energy delivered to street lighting (kw.-hr.)	6,000
Total delivered energy (kw.-hr.)	24,000
Line loss at 15 per cent (kw.-hr.)	3,600
Total energy generated (kw.-hr.)	27,600
Total energy generated in hp.-hr.	40,700
Total fuel oil used, at 1.25 pints per hp.-hr. (in gal.)	6,375
Total fuel oil cost at 4 cents per gal	$256
Cost of lubricating oil	75
Cost of attendance	600
Cost of repairs and lamp removals	150
Cost of heating station	40
Cost of bookkeeping, meter-reading, billing and general service	600
Total operating expense	$1,721

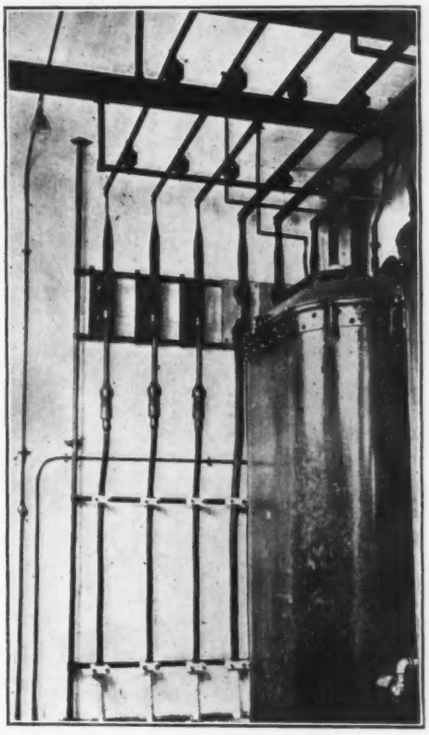
The total annual expenses, as outlined by this table, are $1,721. Since the total net receipts have been estimated at $2,775, a balance of $1,054 per annum, or 18 per cent on the estimated physical cost of the property, remains to care for interest on the plant investment, including the necessary working capital, depreciation, taxes, insurance and other items of expense not included in the operating allowance.

*Abstracted from a paper read before Missouri Association of Public Utilities by J. D. Bowles, utility service and rate engineer Missouri Public Service Commission.

Wiring a Transformer Bank from One End

At the Webster Street steam-generating plant of the Worcester (Mass.) Electric Light Company a fireproof substation has recently been built to house three 2000-kva. transformers used between a new 7800-kva. turbo-alternator and the 2300-volt buses of the station and serving as step-up equipment in feeding several 13,200-volt outgoing lines leading to industrial centers. The substation is situated near the main plant and connected with it by underground cables. Two three-phase circuits are installed, one consisting of two 2,000,000-circ. mil cables per leg, between the transformers and the 2300-volt bus compartment of the station. The other consists of a 750,000-circ. mil cable per leg, between the transformers and the 13,200-volt buses.

The cables enter the substation at one end of the transformer bank, as shown, and after passing into insulated terminals, lead through disconnecting switches from which short twisted copper bars lead to the primary and secondary transformer leads. These leads are formed of horizontal copper bars mounted on insulators clamped to a 1.25-in. pipe frame well above a man's



TRANSFORMER CONNECTIONS AT END OF BANK INSTEAD OF AT THE REAR

head, the bars being carried directly over the transformers and spaced about 8 in. apart. The arrangement facilitates making short drop connections to transformers and clearly separates the 13,200-volt and the 2300-volt wiring. The same pipe frame serves for both classes of circuits, and with this arrangement no loose wiring obstructs the substation. The transformers can also be set closer to the wall than when the leads are brought up at the back of the transformers.

Causes of Boiler Explosions

"Every year there occur in the United States between 1300 and 1400 serious boiler accidents, of which 300 to 400 are violent explosions. These accidents kill between 400 and 500 persons, injure 700 to 800 more, and destroy more than a half million dollars' worth of property," said Mr. William H. Boem in a lecture before the Cornell University student branch of the American Society of Mechanical Engineers.

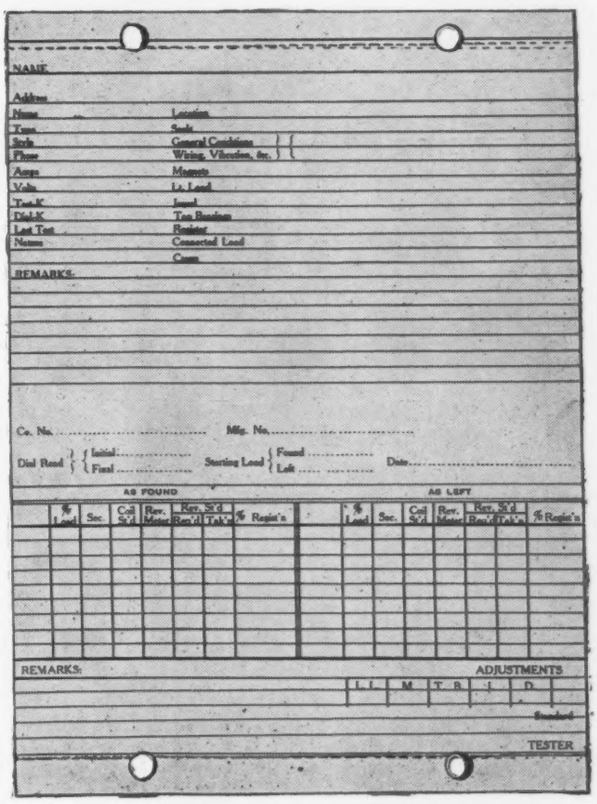
Boiler explosions may be attributed to improper construction, improper installation, or incompetent or careless operation, continued Mr. Boem. Improper construction may consist of unsuitable or inferior material, poor workmanship, abuse of material, as when unmatched rivet holes are drift-pinned to place or uncylindrical shells are sledged to form, or of employing the more dangerous lap-joint for the side seams instead of the more safe and more sensible butt-joint.

Incompetent or careless operation may consist in allowing the steam gage to get out of order, in allowing the water-gage connections to become so clogged as to indicate ample water when there is none in the boiler, in allowing the safety valve to become so stuck to its seat as to fail to blow at the pressure for which it was set, in allowing grease to enter or scale to accumulate in the boiler, in allowing large quantities of cold water to be impinged against hot plates, in allowing the water to be driven from the heated surfaces by forced firing, in allowing a large valve to be opened too suddenly, in allowing two boilers to be cut in on the same steam main when their pressures are unequal, and in allowing minor repairs to be neglected until they endanger the whole structure.

It is significant that many violent boiler explosions occur either just prior to the starting of the engines in the morning, or while they are idle at the noon hour, or shortly after they have been shut down for the day. The reason is that when steam is not being drawn from the boiler it accumulates rapidly and if the safety valve fails to relieve the pressure an explosion soon follows.

Meter-Record Forms for a Small Central Station

Records of meter tests furnish useful and valuable data to the meter-testing and commercial departments of a central station. A simple and inexpensive system of taking and recording meter-test data was described in a paper by Mr. G. W. Strong of the Mansfield (Ohio) Railway, Light & Power Company, presented before the meter conference of the Ohio Electric Light Association. The company with which Mr. Strong is connected supplies electrical energy to the town of Mansfield, Ohio, which has a population of about 22,000. About 2200 meters are connected to the company's lines. The accompanying form is used by the meter testers to record test data. When these sheets are folded once and the binding margin torn off their size is that of a standard 3-in. by 5-in. card, which makes it possible to use them



FORMS ARRANGED FOR FOLDING AND USE IN A 3-IN. BY 5-IN. CARD FILE

in a standard file case without copying. Whenever a meter is tested the second time, the first form slip is taken out of the file. The meter testers can thus keep the file up to date and at the same time avoid copying errors and minimize the labor required.

Coal Oil Used to Prevent Scale Formation

To prevent the formation of scale in the sealing glands of turbines, the Metropolitan Electric Company, Reading, Pa., has adopted the practice of injecting coal oil whenever the machine is shut down. To do this, holes have been drilled and tapped in each gland for 0.25-in. pipe, at the upper end of which an oil cup is placed. It has been found that by pouring about 1 pint of coal oil into the glands after shutting down the machines the scale will be disintegrated and the metal coated so that new scale cannot readily adhere.

Lifting Truck for Handling Stock

To facilitate the moving of stock and the loading of delivery wagons, the New York Telephone Company makes use of portable platforms and lifting trucks, such as shown in the accompanying illustration. The platforms have wooden skids which raise them high enough

LIFTING TRUCK DELIVERING ITS EMPTY AND TAKING AWAY ITS LOADED PLATFORM

above the floor to permit a truck to be pushed under them. When the truck is in position under the platform, a simple arrangement of levers makes it possible to raise the platform off the floor by pressing down the truck handle. A foot lever releases the truck when the platform is to be removed. Similar platforms and trucks can be used for moving moderate-sized transformers and other apparatus around storerooms.

Convenient Portable Tool Cabinet and Equipment for Underground Crews

An inexpensive but convenient portable tool cabinet is used by the underground construction crew of the Worcester (Mass.) Electric Light Company. It consists of a wooden box 2 in. thick, 4 ft. long, 2 ft. 8 in. wide and from 18 in. to 24 in. deep, with a cover held open by a knee brace. The cabinet is mounted on two 36-in. wheels with 1.5-in. steel treads, and is fitted with a handle and tripod, providing for convenient movement and firmness when in place on the roadway. Inside are fifteen compartments and two drawers for the storage of tools and supplies, including lead sleeves, cable joints, saws, tape, soldering materials, torch, insulated stand, etc. The cabinet is hauled to the work by one of the company's electric trucks at a speed of from 8 to 10 miles per hour, and is usually chained and padlocked at night and left on or near the job.

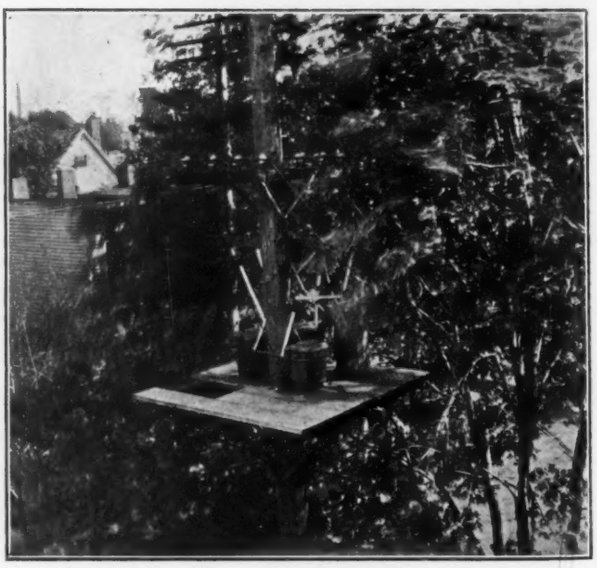
The accompanying illustration shows the tool cabinet

TOOL CABINET IN USE BY UNDERGROUND SERVICE CREW

in use. At the right a galvanized-iron folding manhole guard 30 in. square is also shown, which supports a signal flag and is used whenever the crew is working in a manhole. A smaller similar guard is used when torches are used in the street.

Method of Mounting Distribution Transformers

The pole-type transformer installations on the distribution lines of the Toledo (Ohio) Railways & Light Company which exceed 10 kw. in rating are now mounted on supporting platforms of the character shown in the accompanying illustration. Installations of this type, it is thought, afford the company's workmen greater convenience and safety and save time in making repairs. If a transformer bank must be placed on a pole surrounded by shade trees which the owner will not permit to be trimmed, 12-in. lengths of porcelain tubing are used to inclose the exterior wiring of the bank so that the tree limbs when thrashing in the wind will not injure the insulation. The illustration shows a bank of small units with the wiring protected from the whipping branches.



SUPPORTING PLATFORM FOR TRANSFORMER INSTALLATIONS LARGER THAN 10 KW.

COMMERCIAL SECTION

Where Figures Prove the Policy

Resumption of Sale of Appliances by Rochester Company Results Successfully for Central Station and Increases Business of Local Dealers

SEVEN years ago the Rochester (N. Y.) Railway & Light Company discontinued the sale of electric appliances. Before this household devices had been sold by the company, but its sales department was then not well organized to handle a merchandising business, and the result was that appliance sales did not prove profitable. The company, therefore, decided to turn over the retail merchandising of all household heating and motor devices to the local electrical contractors and dealers, for it was felt that the dealers could probably handle the business more effectively than the central station. The dealers and contractors were quite willing to assume the exclusive sale of appliances, feeling that with their small overhead expense this could be made a profitable business.

For six years the Rochester Railway & Light Company referred all inquiries to the dealers and itself remained entirely out of the field, but results were not entirely satisfying. After a careful analysis it was found that the market was not being developed so fast as it should be, for the contractors could not afford to invest their money in expensive selling campaigns, and the amount of sales made over the counters naturally did not run very high.

On April 1, 1914, therefore, the company resumed the sale of appliances to a limited extent; that is, the sale of a restricted assortment of devices such as flatirons, percolators, disk stoves, washing machines, vacuum cleaners, etc., which were selected as the most promising from a merchandising point of view. Other devices not included in the selected list were left exclusively to the contractor.

Pointing the Way for the Contractor

Before this action was taken, however, the contractors were called together and the situation was discussed at length, the company assuring them that the resumption of appliance sales by the central station would bring

ATTRACTIVE WINDOW DISPLAYS PLAY NO SMALL PART IN THE SUCCESSFUL APPLIANCE SALES CAMPAIGNS OF THE ROCHESTER RAILWAY & LIGHT COMPANY

even greater opportunity to the contractor, through a proper maintenance of prices and a stimulation of the market by active campaign work.

Plans were made to operate the new appliance department, in charge of Mr. William S. Wallace, on a self-supporting basis, and four saleswomen and one salesman were employed to work continually on a salary and commission basis, thus providing a fixed minimum remuneration to cover slack seasons and assuring these employees of a proper additional compensation as a reward for increased production. The salaries varied according to conditions, but the commission was figured always at 45 per cent of the gross profit of the goods sold, this commission not being paid until after the article was actually paid for by the customer. The arrangement has been very effective, as the commission is constantly encouraging the salespeople to the sale of a better quality of appliances. The work has progressed so fast that practically very little house-to-house canvassing has been done, almost all the "prospects" having come in through inquiries. These inquiries were secured from direct advertising by letter, general advertising in the newspapers, the sending of electric irons to all customers newly connected, and from other sources.

Details of the First Year's Sales

The work of the first year as covered by the report of the department at the end of March, 1915, was particularly gratifying. Net sales of 2696 appliances had been made, on which the average income figured 60 cents per appliance. The total estimated average yearly income therefore figured no less than $19,435.20. The appliances were classified as follows:

Irons, 3-lb.	25
Irons, 6-lb.	1913
Irons, 8-lb.	176
Toasters	168
Percolators	82
Heat pads	38
Luminous radiators	50
Table grills	14
Vacuum cleaners	118
Washing machines	37
Specials	74

In the sale of these 2700 appliances not one device was sold for less than the list price, and in consequence the direct profits from the sales themselves have more than paid for the cost of the department. Throughout the year the salesmen averaged a total income of from $20 to $25 per week, and the contractors have reported an increased business in the sale of appliances. Prices have been maintained by these local dealers satisfactorily, and the total of their appliance sales has been about as large as those of the Rochester Railway & Light Company, owing to the greater public interest in the household applications of electricity which has been induced by the work of the light company's salesmen. The experience at Rochester thus gives a particularly interesting demonstration of the value of creative work in the development of the appliance market, and of the fact that every dealer and every contractor inevitably shares in the increased business which results.

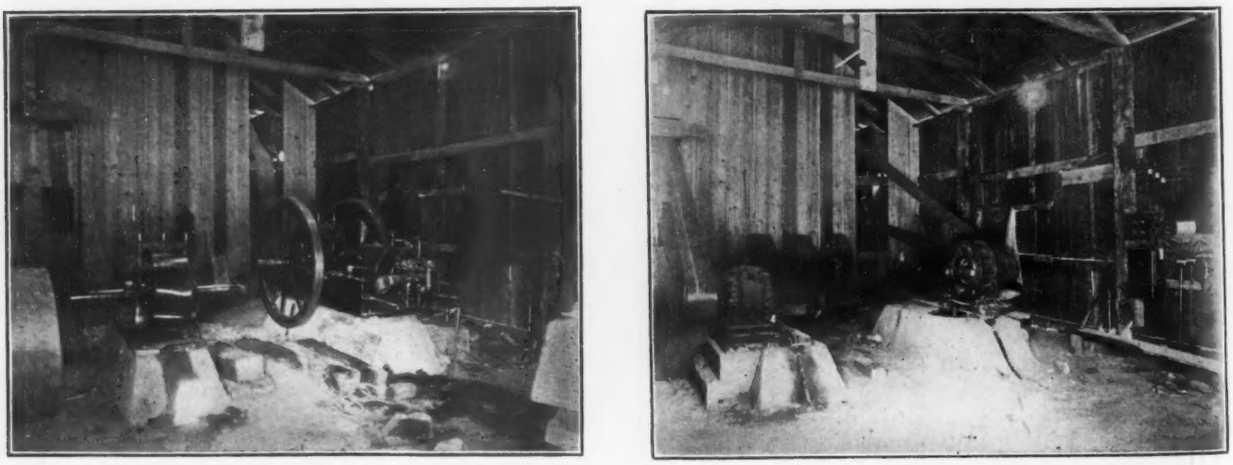
Motors Show Saving in Replacing Gasoline Engines in Brickyard

After first trying gasoline engines and later discarding them in favor of electrical equipment, the firm of Elliot & Godfrey, Kansas City, Mo., manufacturing 450,000 shale dry-process bricks a month, has found that central-station-service drive is much more satisfactory than gasoline-engine drive. The experience required to prove the point was costly, but now that the firm has reduced its energy consumption to an average of 8.6 kw-hr. per 1000 bricks, it is certain that the change was justified. Formerly the brick molds were heated with steam, but since electricity has been adopted to drive the machines, it has also proved entirely satisfactory for heating.

MOTOR APPLICATION IN BRICKYARD

No.	Hp	R.p.m.	Application
1	35	750	General Electric Company motor belted to countershaft. Gear drive from shaft to pan. Friction clutch. Motor pulley 13 in. to 60 in. to 36-in. to 28-in. machine pulley. Driving one 9-ft. dry pan and one 30-ft. elevator from pan to molding machine.
1	15	710	Westinghouse motor belted through countershaft. Motor pulley 14 in. to 60 in. to 36-in. to 28-in. machine pulley driving one Berg brick press, made by Anderson Foundry Company, Anderson, Ind. Triple press. Four bricks at once.

The plant operates ten hours a day and employs twenty men. Its total connected motor load is 50 hp in motors of the three-phase, 220-volt squirrel-cage type. The electrical heating load is about 5 kw. Tests have shown that the maximum demand is 27.1 kw and the load-factor during the operating period is 85 per cent. Gas is used for drying and burning the bricks. The total time required for completing these operations is eleven days. The rated capacity of the plant is 20,000 bricks in a ten-hour day.



THE GASOLINE ENGINES WHICH FORMERLY OPERATED THE BRICK-MAKING MACHINES IN THE ELLIOT & GODFREY PLANT, AND THE ELECTRIC MOTORS WHICH HAVE REPLACED THEM ON THE SAME FOUNDATIONS

For the Man Who Does Not Believe in Electric-Sign Advertising

"I am always amused when a merchant tells me he doesn't believe in advertising," said Mr. E. R. Kelsey, advertising manager of the Toledo (Ohio) Railways & Light Company, in a paper read before a recent meeting of the commercial men of the Ohio Electric Light Association. "'All right,' I tell him. 'Take in the painted sign above your door! Take out your window display! Take your goods out of the showcases! Why, man, your every action shows that you do believe in advertising, and when you say you don't you haven't been fooling a soul but yourself.'"

Why does a man shave when he gets up in the morning? Why is he so particular about his personal appearance? It is his own individual way of advertising, of stamping his personality on those with whom he comes in contact. The electric sign stamps the firm name and message or trade-mark indelibly on those who pass that way. It stamps the merchant as one particular about appearances. All of us like to shop in pleasant and inviting places. It is a well-known fact that people frequent well-lighted streets. Light puts people in a pleasant frame of mind, and no one is in a buying mood who has not imbibed that atmosphere of good cheer which light creates.

The Newspaper Advertiser Is a Prospective Customer

Is there a merchant advertising in the newspaper who has not as yet an electric sign? Remind him, said Mr. Kelsey, that the people read his advertisement in the

TWO TOLEDO "MOVIES" USING OUTLINE SIGNS AND SPECIAL LOBBY LIGHTING

printed pages only if they care to, whereas his message in letters of fire compels people to read it and compels them to remember his location. At best his newspaper advertisement has a limited field. A few people on a certain given day are the only ones who can possibly see it. His electric sign compels attention, not only from those passing by, but even from those blocks away. At night all forms of popular advertising fail except those in the electric field. During the day people are busy. They are hurrying from place to place. They haven't much time to let advertising sink in. But at night they are in a receptive mood. They have time to read advertising; they digest the message it brings.

Rival Merchants Will Try to Outdo Each Other

"Personally I have never heard any good objection to the electric sign," continued Mr. Kelsey. "I have heard men making excuses for not buying one, but the bright salesman, who never admits defeat, takes this as his cue to open up a new broadside. Every man has a natural longing to beat the other fellow. If a merchant's rival in the next block or the other street puts up a sign, the merchant can easily be made to believe that he should have a better one. No man wants to trail along. To the man who wants to lead suggest, therefore, the moving sign. I have always believed that a man who did not in some way get a flashing or moving effect in his sign was really losing about 50 per cent of its effectiveness.

Looking at the Cost from a Different Angle

"Many merchants still have the idea that everything electrical is expensive. The first cost of an electric sign looks big to them, but ask them to figure up how much newspaper advertising they could buy for the price of the sign. Assuming that a hundred-dollar sign is under consideration, they should be made to realize that not even a page in a single newspaper could be bought for a day with a like amount.

"Again, the salesman may ask the merchant candidly, 'Would it be worth one dollar a day for you to place a flashing electric sign on your store from dusk to midnight every night in the year?' Of course, there isn't a merchant worthy of the name who could answer the question in any but one way. Then you could surprise him with the quality of the sign you could erect for $300.

"To the smaller merchant the 50-cents-a-day proposition is attractive," said the speaker in closing. "Men buy diamonds at 50 cents a day who would never think of paying cash for them. Ordinarily we think of women as being prone to adopt the instalment plan, but men are just as likely to accept such an offer. How many pianos and victrolas would be sold if they were to be paid for in a lump? Adopt modern merchandising methods in the sign business and put your offer up to the customer in such a way that he cannot easily turn it down; and don't be afraid of the instalment plant."

Combining Electric-Range and Water-Heater Loads

The Washington Water Power Company, Spokane, Wash., has found that the chief obstacle encountered in persuading customers to substitute electric ranges for wood and coal stoves has been the difficulty in providing some method of heating water which would not make the electric-service bills too high. The company has therefore developed an electric water heater which can be connected with ordinary domestic hot-water tanks and operated when the customer's electric range is not in operation. In this way wires, meters, transformers, etc., designed to serve the range alone can be used for both the range and heater if the latter are operated separately.

The heater consists of a brass tube about 3 ft. long and having an internal diameter of 1.75 in. Around the tube is wound a double spiral of square copper wire about 0.125 in. wide and spaced 0.125 in. apart. High-resistance wire is wound in the grooves on asbestos seats and the entire unit is treated with three coats of enamel and then baked. To minimize heat radiation the unit is insulated with a covering of magnesia.

Tests made with this heater in actual use indicate the following results: Starting with cold water in the tank, hot water was available in fifteen minutes. By permitting the heater to operate during the entire night preceding washday sufficient hot water was obtained for an ordinary family washing. From Feb. 12 to April 1, a meter on the tank showed a consumption of 636 kw.-hr., or 13.5 kw.-hr. a day. An analysis of the earnings from twelve 2-kw. ranges over a period of 100 range-months showed that they consumed on the average about 780 kw.-hr. a year each, or 2.1 kw.-hr. a day.

Interior Photography with a Gas-Filled Lamp

The amateur photographer whose picture-taking about his home after nightfall was formerly limited by the old-time inconvenient and dust-producing "flashlight" will find the gas-filled tungsten lamp a useful help in home photography. The cozy nooks of his own dwelling, for example, can be pictured effectively by a few minutes' exposure with a 200-watt unit inserted in one of the wall or ceiling fixtures. Owing to its richness in actinic rays, the gas-filled lamp requires only a fraction of the exposure necessary with the vacuum-type illuminant. In the average 12-ft. by 15-ft. room with medium-tinted walls and ceiling an exposure of two to four minutes, with the camera stop opened to, say, "8" on the diaphragm scale, will be found sufficient for excellent interior picture-taking after dark. Such a gas-filled lamp is also useful for lighting up dark corners and shadows when taking interior pictures with the aid of daylight that enters through the windows.

A Fourth-of-July Booth That Sold Twelve Ranges

Mr. J. K. Trauerman, manager of the Holstein (Iowa) Service Company, took advantage of the July Fourth celebration in his town to advertise electric cooking. That his advertising methods were successful is shown by the fact that in ten days following the Fourth he sold twelve electric ranges.

HOT ELECTRICAL "WIENIES" SERVED FREE DURING THE HOLSTEIN (IOWA) CARNIVAL

"We built a booth on the curb line and in it arranged a small kitchen decorated in spotless white and equipped with two Hughes electric ranges, an ice box, a table and a kitchen cabinet," writes Mr. Trauerman. "A few household electrical devices were also displayed. From this neat kitchen we served free lunches all day.

"Our aim was fourfold: First, we wanted to answer the inquiries of the twenty-five customers who already had ranges concerning economies which they could effect; second, we wished to convince 'wavering' prospective customers that electric ranges are economical; third, it was our desire to boost everything electrical, and, fourth, we wanted to emphasize the importance of the electrical industry in our city.

"Although we have a population of but 1100, we now have thirty-seven electric stoves in operation. Our rates range from 4 cents per kw.-hr. to 2 cents per kw.-hr., which allows cooking to be done with electricity at about the same price as with gas at $1 per 1000 cu. ft. These low rates have been made possible because the cost of producing electrical energy with our three Mietz & Weiss oil engines is low. The aggregate rating of our plant, which supplies twenty-four-hour service, is 200 hp."

THE SALE OF TWELVE ELECTRIC RANGES FOLLOWED THE DEMONSTRATIONS IN THIS BOOTH

Electric Roll Chairs at the California Expositions

The expositions now in progress on the Pacific Coast offer visitors the novelty and comfort of riding about the broad intramural avenues in silent, easy-going electric roller chairs. More than 200 such chairs are in use at the San Francisco fair, and a lesser number are in service at San Diego, where the accompanying photograph was taken.

Each chair carries two persons, one of whom steers and controls the chair. The average speed is about 3 miles per hour. Some of the chairs are equipped with extending bumpers which are connected with the control apparatus and brakes. If such a chair runs into an obstruction of any kind the pressure on the bumper instantly throws off the power and sets the brakes, bringing the car to a stop within a few inches. The battery equipment averages ten 150-amp.-hr. cells, which are capable of operating the 0.5-hp. motor about eight hours on one charge.

ELECTRIC WHEEL CHAIR AT THE SAN DIEGO FAIR

NEW APPARATUS AND APPLIANCES

Outlet-Box Receptacle

In the accompanying illustration is shown an outlet-box receptacle made by Harvey Hubbell, Inc., Bridgeport, Conn. This receptacle is provided with a compact conduit plug equipped with T slots which make the device interchangeable with seventeen different types of caps made by the above manufacturer. The receptacle can be readily attached by clamping the outlet-box cover between the upper and lower porcelain pieces by means of a center screw which threads through both parts. A leather washer is placed between the top porcelain piece and the outlet-box cover to take up variation in the space between the porcelain parts and the cover and to prevent the plug from rotating as a consequence of vibration.

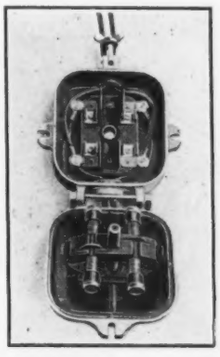
OUTLET-BOX RECEPTACLE WITH T SLOTS

The method of attachment is said to do away with the necessity of drilling and tapping holes in the bottom of the fitting. A variety of outlet boxes and "condulets" are adapted for use with the receptacle.

Fused Switch

A switch of the quick-make-and-break type, provided with repulsion-type fuses which are inclosed with it in a single case, has been developed by Berry, Skinner & Company, 78 Upper Thames Street, London, E. C., England.

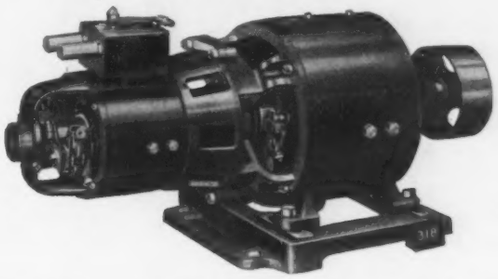
All of the energy-carrying parts of the "Adanac" switch, as it is called, can easily be replaced, it is claimed, from the front. The movable switch contacts are arranged to revolve, so that when a contact has been burned it can be turned to present a clean contact surface. The circuit is broken with a parallel action at contacts on each pole, which are in series with each other. When the switch is "on" the cabinet is automatically locked, and the contents cannot be tampered with or the fuses renewed until the switch is re-closed. The case is drilled and tapped for a single conduit to go to and from the box.



SWITCH WITH COVER OPEN, SHOWING PARTS IN "ON" POSITION FOR INSERTING OR REMOVING FUSES

Small Generating Outfit

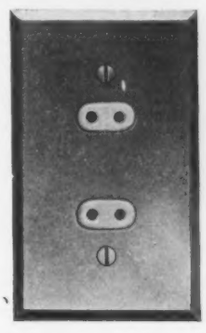
Apparatus consisting of a large generator and a small generator mounted on the same shaft for operation with a gasoline engine for generating energy to light country homes, amusement parks, hotels, etc., is shown in the accompanying illustration. The larger unit is employed to generate energy for lighting, while the smaller one is employed to charge a small storage battery which operates the machine as a motor to crank the engine in starting the outfit. No battery is employed in the system for lighting the lamps. Whenever light is desired at any point in the system a button is pushed which closes the circuit between the small storage battery and a solenoid. The solenoid closes the switch, throwing the small machine on the battery. The small machine then runs as a motor and cranks the engine. The small machine operates at 6 volts, while the larger generator operates at 110 volts. The latter may be either an alternating-current or a direct-current machine. The smaller generator may be utilized as an exciter for a large alternating-current generator as well as for furnishing energy to charge the battery for cranking.



SMALL GENERATING SET FOR USE WITH GASOLINE ENGINE

Duplex Flush Receptacle

The flush receptacle shown herewith is provided with two outlets and can be attached, it is declared, to any standard receptacle box. The manufacturer points out that it may be utilized in floor outlet boxes since the small porcelain bosses which receive the points of the plug are flush with the surface of the plate, and therefore, when the device is used with a square-edged plate, it is possible to provide a smooth and unbroken floor surface. The "Junior" receptacle, as it is called, is rated at 6 amp. at 250 volts, and is being made by the Bryant Electric Company, Bridgeport, Conn.



FLUSH RECEPTACLE WITH TWO OUTLETS FOR USE WITH ANY STANDARD BOX

Field and Armature Tester

Recently developed apparatus for testing fields and armatures is shown in the accompanying illustrations. The tester in Fig. 1 is designed especially for use with railway motors, and the manufacturer, the Century Electrical Company, Syracuse, N. Y., points out that it is a quick detector of weak fields and faults in armatures. It can be used to test the fields when in the motors

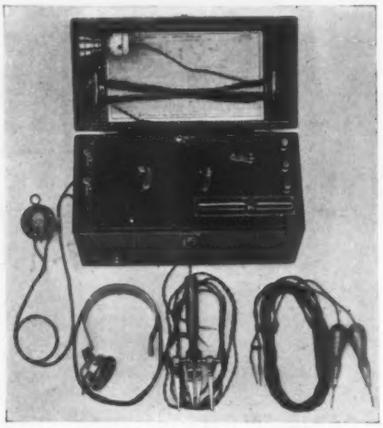


FIG. 1—TESTING INSTRUMENT FOR USE WITH RAILWAY-MOTOR ARMATURES AND FIELDS

or out, as desired, and for testing armatures for short-circuits and grounds, without raising the leads or disturbing the hoods. The device can be operated by direct current from the ordinary lighting circuit. When testing fields the readings are obtained by sliding the pointer knob along the scale to the point where two distinctly separate sounds become as one. The armature test consists of a bar-to-bar test with a telephone receiver and contact fork. The device is provided with an adjustable fork, head band and special receiver for testing armatures and leads and contacts for testing field coils.

For use in noisy places, where too much noise might

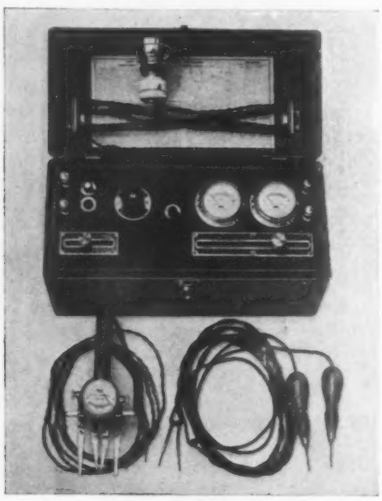


FIG. 2—FIELD AND ARMATURE TESTER WITHOUT TELEPHONE RECEIVER

interfere with the use of a telephone receiver, the tester shown in Fig. 2 has been developed. It operates on alternating current. Instead of a telephone receiver, meters with pointers and dials are employed. When testing field coils the readings are obtained by sliding the pointer along the scale until both meters read the same. The armature test is a bar-to-bar meter test. A meter is mounted in a convenient position on the testing fork. The instrument is provided with an adjustable contact fork and meter for testing armatures

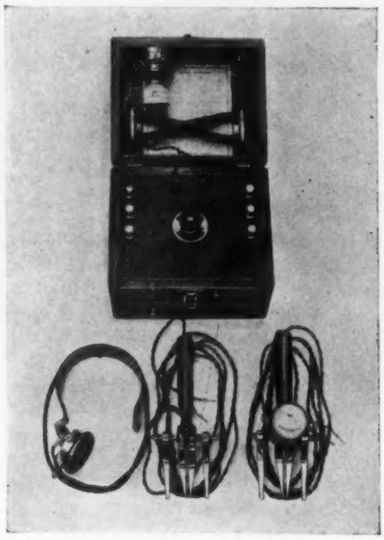


FIG. 3—SMALL ARMATURE-TESTING INSTRUMENT

and a set of leads and contacts for testing field coils.

In Fig. 3 is illustrated a small device for testing armatures on either alternating current or direct current obtained from ordinary lighting circuits. A hard-rubber knob with knurled edge permits changing over from one kind of current to the other. By using this instrument the manufacturer claims that short or open circuits and grounds can quickly be detected and located without disconnecting the leads or removing the hood. The device can be provided with an alternating-current or direct-current adjustable contact fork as desired.

Low-Voltage Transformer for Toys

To eliminate the necessity of using dry batteries for operating electric toys, the Packard Electric Company of Warren, Ohio, has brought out a toy transformer. The device is rated at 125 watts, and when its primary winding is connected to a 110-volt source low potentials

TOY TRANSFORMER WITH CORD AND ATTACHMENT PLUG

for operating miniature lamps, toy motors, bells and electric trains are available on the secondaries. The transformer is 5 in. high and 4.625 in. in diameter, weighs 6.5 lb., and is equipped with 9 ft. of cord and an attachment plug.

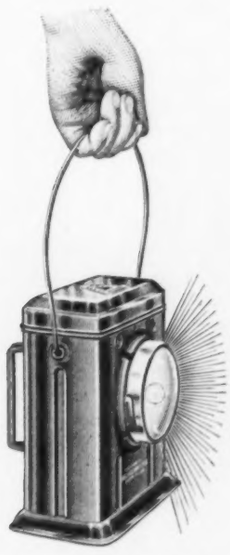
Lineman's Rubber Sleeve

Seamless rubber sleeves have been developed by the Canton (Ohio) Rubber Company for use by linemen in connection with rubber gloves. By eliminating the seam one sleeve can be reversed and can be used with either arm, as the inside and outside surfaces are exactly alike. The color of the sleeves is dark-maroon, and the sleeves are tested for pressures up to 10,000 volts or above, according to specifications.

RUBBER SLEEVES FOR PROTECTION OF LINEMEN

Electric Lantern

An electric lantern which operates on two dry cells has recently been developed by the Delta Electric Company, Marion, Ind. Use is made of a 3-volt bulb provided with a drawn tungsten-wire filament which is sealed off with platinum wire, the seal being made through a glass stem. The case of the lantern is of cold-rolled sheet steel, and the base is flanged so that it will not readily tip over. A heavy drop-bail handle is keyed to the case. A grip handle is also provided at the back of the case which can be folded flush with the latter when not in use. The reflector is of brass and is ribbed in such a manner as to give a broad, spreading light. It is heavily silver-plated and polished to a mirror finish. The switch is in a protected place on the back of the lamp and is equipped with German-silver contact points which, it is declared, are always under firm spring tension. Use is made of a convex-concave lens. The lantern is finished in gloss enamel with nickel-plated trimming.



LANTERN OPERATED ON TWO DRY CELLS

Electric Laying-Off Board for Cleaning Gloves

In the ordinary cleaning establishment after gloves have come from the "extractor" they are taken to a drying room for fifteen or twenty minutes. To finish the operation, however, they are often removed from this drying room before they are entirely dry and are placed on laying-off boards. In the accompanying illustration is shown an electrically heated 16-in. tuck-finger laying-off board designed for use on 110-volt circuits. The board shown is large enough for the average woman's glove, while a 22-in. board is of sufficient size for the average man's glove. The manufacturer, the C. L. McBride Manufacturing Company, 1213 Norwood Avenue, Toledo, Ohio, claims that there is no danger of burning the gloves even if by accident they are left on the board for several hours.

ELECTRIC LAYING-OFF BOARD

Large-Sized Multiple-Switch Starter

A combination starter and speed regulator of the multiple-switch type has recently been developed by the Industrial Controller Company of Milwaukee, Wis. The first three switches of the controller are used for starting only, the next four for speed reduction by inserting resistance in the armature circuit, and, in addition to speed reduction, for increase of speed above normal by inserting resistance in the shunt field. Two levers are provided for operating the switches, one of which is held up by the operator with his left hand while the first

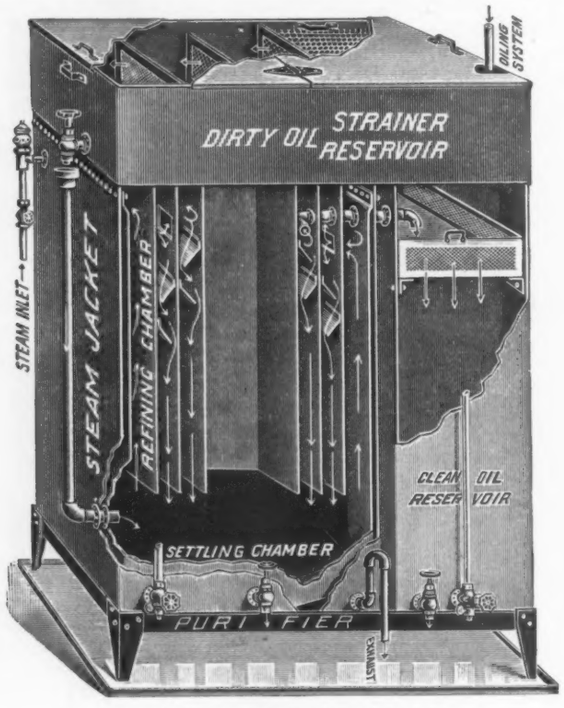
MULTIPLE-SWITCH COMBINATION STARTER AND SPEED REGULATOR

three switches are put in place with the other. Should the left-hand lever be released before the three switches are set, the switches will return to the off position, thereby preventing the use of the first three switches for anything but starting duty. When the switches have been set the remaining four switches may be operated in or out at will by means of the right-hand lever. The shunt-field resistance is inserted when all of the multiple-switch levers are in place by means of a small lever on the lower panel. No-voltage protection is provided.

Combination Oil Filter and Oil Refiner

The apparatus shown herewith is designed to purify all kinds of used lubricating oils. It is also well adapted for use, it is claimed, for removing moisture, entrained water, free carbon and other conductive impurities from used transformer oils. The oil is led into a refining and purifying chamber which is surrounded by a heating jacket. The chamber is equipped with a series of special deflecting shields. In passing through the filter the oil first receives a triple screening treatment, then descends through a feed pipe to the refining and purifying chamber, where impurities tend to separate from the oil and settle to the bottom of the chamber, whence they may be flushed out at intervals by opening the drain valve; at the same time acids or excess volatile matter is also passed off.

The incoming impure oil from the feed pipe gradually forces the oil upward through the refining chamber, then through the upper passageways of the precipitating channels in a horizontal direction; finally, after being subjected to the combined refining and purifying processes, it overflows from the inner precipitating channel through the discharge pipe into the filter box, thence into the clean-oil reservoir, from which the purified oil



STEAM-JACKETED OIL PURIFIER

is delivered at the draw-off valve. An adjustable feed valve is provided for giving an even flow of oil to the purifying chamber. The apparatus is being made by the Famous Filter Company, 306 North Commercial Street, St. Louis, Mo.

Expansion Bolts

A recently developed expansion bolt has been brought out by the Parker Supply Company, 527 West Twenty-fifth Street, New York, which is provided with lugs to prevent it from turning. The projections are arranged

FIG. 1—EXPANSION BOLT WITH LUGS

as shown in the cross-section in Fig. 1 and are said to prevent effectively both right-hand and left-hand movement. The manufacturer points out that the circumferential ridges insure a proper resistance to stress in

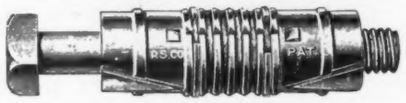
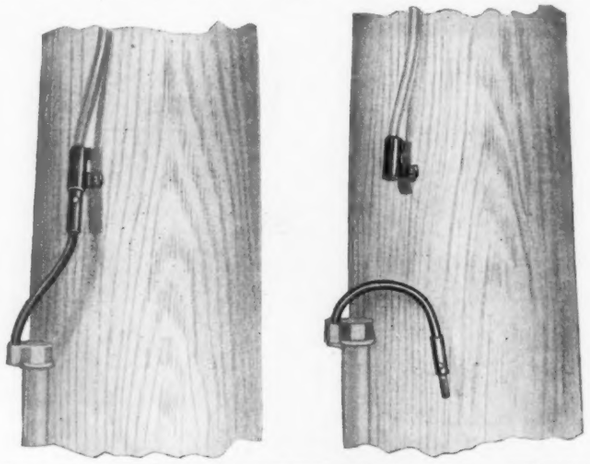


FIG. 2—EXPANSION BOLT WITH SPRING BAND

the direct line of the bolt. The steel-spring band of the bolt, shown in Fig. 2, holds the halves together and on account of its flexibility allows the shield to expand freely. The bolts are made of malleable iron.

Ground-Wire Disconnector

A lightning-arrester ground wire which is attached to a line pole presents an element of danger to a lineman who may climb the pole on a wet night, because he is liable to cross himself with the ground wire and a live wire or live piece of apparatus. A device designed to eliminate this danger, which is called the Garton-Daniels ground-wire disconnector, is shown herewith and consists of a brass casting which can be screwed to the side of the pole. At the top a lug is provided into which a No. 4 or No. 6 B. & S. solid wire running from the lightning arrester may be soldered. At the bottom another lug is provided into which a split brass plug slides. This plug is furnished with 12 in. of No. 6 flexible copper cable, the free end of which is soldered into a standard brass cap screwed to the end of the lightning-arrester ground pipe. In mounting



FIGS. 1 AND 2—GROUND-WIRE DISCONNECTOR, SHOWING CONNECTED AND DISCONNECTED POSITIONS

the pole the lineman pulls out the plug as he ascends, thereby disconnecting the upper wire and lightning arresters from the ground and rendering the work on the pole comparatively safe. The disconnector is also well adapted for use where lightning arresters are tested.

CURRENT NEWS SECTION

Work of Standardization Before the N. E. L. A. Accounting Section

The executive committee of the new Accounting Section of the National Electric Light Association will hold its initial meeting at the office of the Commonwealth Edison Company, Chicago, on Aug. 10. That city was selected for the gathering place in order to give Far Western members an opportunity to attend. The committee will decide upon the various committees to carry on the work of the section and will then select the members thereof. Members of the executive committee have been requested to furnish lists of members available from their sections of the country.

"In the earlier history of the accounting committee," said Chairman H. M. Edwards of the new section to a representative of the ELECTRICAL WORLD, "the practice was to make up the various committees from members of the accounting committee. Now the idea is to obtain on the committees as thorough a representation as is practicable from the various parts of the country. I am even getting requests for representation on the committees. Younger men find that committee work gives them an opportunity to serve which they are very glad to accept."

In discussing the work before the Accounting Section Mr. Edwards said: "Standardization is one of the developments of greatest importance for the future. There is undoubtedly a need for complete standardization in classification and methods. No good reason exists why each State commission should have little pecularities in the system which it prescribes for electric utilities when a uniform classification would meet all the needs of accounting and furnish a country-wide basis of comparison. Any organization which does business now in many States has to have a number of different accounting systems, and in this way it loses much without gaining anything as compensation.

"The Interstate Commerce Commission classifications of accounts for utilities under its jurisdiction have done a great deal to promote uniformity. Commissions of all States now have provisions, for instance, for reserves. Where rates of electric utilities are subject to change it is highly important that operating expenses reflect all costs, and the method of meeting this question of reserves should be uniform. To cite a few of the States, New York, New Jersey, New Hampshire, Maryland, Ohio and Wisconsin have at present accounting systems with either material or slight differences. The Michigan Railroad Commission adopted the complete N. E. L. A. classification. In its officially prescribed classificafion the Maryland Public Service Commission made slight changes in the N. E. L. A. system, but the use of this system by companies is satisfactory to the commission.

"The Accounting Section should go over the different classifications and list them and then see what can be done to eliminate the points of difference and effect standardization. One way to test the matter would be to take, say, the N. E. L. A. classification as standard and study the differences in each group of accounts and text. Of course, the differences may be so great that standardization between the different systems will be impossible without radical changes, but if that is the condition the earlier it is appreciated the sooner will steps be taken to bring about standardization of ideas."

Hydro-Electric Power Commission of Ontario to Develop 250,000 Hp.

It is reported that within a week or so the Hon. Adam Beck and his colleagues of the Ontario Hydro-Electric Commission will submit to the Ontario government plans providing for the development at Niagara Falls and from the spillways of the New Welland Canal of 250,000 hp., and for an immediate development of 100,000 hp., a work that will entail a capital expenditure of approximately $10,000,000 and require three years to complete.

Under the treaty between Great Britain and the United States governing the amount of water that can be taken at Niagara Falls, there remain about 6600 cu. ft. of water per second available on the Canadian side. The plans of the engineers of the Hydro-Electric Commission contemplate the use of this water. It is understood that the commission will erect a plant at Chippawa Creek that will enable power to be developed on both the Niagara River and the Welland Canal spillways. The commission also purposes to go to the Minister of Railways and Canals and ask for the water-powers that were promised on the Trent Canal, from which can be developed from 15,000 hp. to 20,000 hp., unless satisfactory arrangements can be made with the interests now controlling the power in the Trent Valley.

Electrical Machinery for Submarines

Information from Washington as to the sixteen new submarine boats authorized by the last Congress is to the effect that not only is all of the propelling machinery used when the boats are submerged electrical, but they will carry electrical machinery for operation of the ventilation system, the windlass for anchor, pumps for sinking and raising the boats and steering gears and diving gears, as well as radio and electrical cooking apparatus.

Bids for these boats were to have been opened at the Navy Department on Aug. 2, but the date for the opening of the offers has been postponed until Sept. 29, in order that the Newport News Shipbuilding & Drydock Company and the New York Shipbuilding Company, which obtained the right to build the European submarine known as the Hay-Denny type, might compete. These companies obtained recently American rights as to this type of boat. Secretary Daniels announced the gratification of the Navy Department that large American companies are entering the submarine building field. The sixteen boats will be known as the O type. They will have a surface cruising radius of between 5000 and 6000 miles and will be equipped with the 3-in. disappearing gun developed recently.

Eleven boats of the L type are being completed. The L-8, being built at Portsmouth, N. H., by the Lake Torpedo Boat Company, is the only one of this type, so far as is now known at the Navy Department, which will contain the Edison storage batteries. It is said at the Navy Department that private contractors cannot afford to install the Edison batteries, and that these batteries have been authorized on the L-8 by the government as an experiment. Two of the G class boats are still to be delivered by the Lake Torpedo Boat Company. Recent

tests of the G-3 have shown that it can cruise 5500 miles without refueling, and can make 11 knots an hour. Seven of the N class are being built; these contain the newest ideas prevailing prior to the design of the O type, bids for which are to be opened in September.

Captain Lake of the Lake Torpedo Boat Company has suggested the feasibility of big "freighter" submarines, and as an experiment the Navy Department is now building the largest submarine ever constructed in this country. This is known at the bureau of construction and repair as the Schley, "a cruiser submarine." It is also understood in Washington that naval constructors are at work upon what is called a "baby submarine," to hold but one or two men and to carry a torpedo of small size. Information as to its design is not available. The drawings are not completed.

Convention of Contractors' Association

Reports from San Francisco indicate that the convention of the National Electrical Contractors' Association held in that city last week and reported in last week's number of the ELECTRICAL WORLD was most profitable. Mr. Paul H. Jaehnig of Newark, N. J., presented a report to be added as an appendix to the pamphlet on legislation which is distributed gratis by the association, and also announced that within the week city ordinances had been passed in St. Louis and New York requiring the licensing of electrical contractors. Moreover, about a dozen other cities are considering similar legislation.

Past-president G. M. Sanborn of Indianapolis, Ind., reported that the universal data and salesbook had been completely revised and that much additional information was being added.

As master of transportation, Mr. V. G. Gilpin of Brooklyn reviewed the features of the trip West, and praised the Los Angeles entertainment committee which met the train 40 miles east of that city and took the visitors into the city in automobiles. At the conclusion of his report Mr. Gilpin was elected master of transportation of the National Electrical Contractors' Association for the coming year.

Past-president James R. Strong of New York, chairman of the national convention committee, reported on the receipts and disbursements of last year's convention and supplemented Mr. Gilpin's appreciation of the hospitality extended by the contractors of southern California. He also pointed out that in San Francisco the local committee had established a precedent by relieving the national committee of practically all of the local entertainment.

Mr. J. T. Marron, Rock Island, Ill., chairman of the national committee on membership, reported on the card-system scheme for investigating electrical contractors proposed for membership. This plan, which has been on trial since last October, has been found to be productive of much information of value, and the proposal to continue the system was hearily indorsed.

The committee on credentials reported heavier duties than at any previous convention. According to the rules of the organization for the election of officers, each member present can cast his own vote and a maximum of nine proxies. The new revenue law requires that a 10-cent stamp be placed on each proxy, to be canceled when the proxy is used. About 500 proxies, all properly stamped, were brought to San Francisco. The registration at the convention was about 250.

The committee appointed last year to investigate the reduction of cost in electrical construction, of which Mr. A. J. Hixon, Boston, is chairman, announced that the use of concentric wiring is being considered.

The co-operative protective committee, Mr. Ernest Freeman, Chicago, chairman, stated that during the past year eight important contractors' disputes had been arbitrated to the satisfaction of all concerned and without cost to the disputants. The evils of buying cheap electrical supplies in 5-and-10-cent stores and over department-store bargain counters generally was discussed, and the association resolved to request manufacturers to limit their sales to regular electrical supply dealers.

The American Institute of Architects' standard documents and specifications were approved with unanimous indorsement, as was the suggestion that the association request members to specify these forms whenever possible.

The question of where the convention should be held in 1916 was referred to a committee, which reported in favor of New Orleans. The selection was approved by the convention, and the date of next year's meeting was set for the third Wednesday in October.

New officers were elected as follows: President, Mr. John R. Galloway, Washington, D. C.; first vice-president, Mr. W. L. Hutchinson, Kansas City, Mo.; second vice-president, Mr. J. C. Rendler, Los Angeles; third vice-president, Mr. J. S. Musser, Harrisburg, Pa.; treasurer, Mr. James S. Hilton, Syracuse, N. Y.; secretary, Mr. George H. Duffield, Utica, N. Y.; sergeant-at-arms, Mr. James F. Burns, Schenectady, N. Y. Mr. L. R. Boynton, San Francisco, who had been proposed as opposition candidate for the office of third vice-president, withdrew "for the sake of harmony."

A very handsome silver-mounted cane was presented to Secretary Duffield by President Galloway as a personal tribute in recognition of the effective service which Mr. Duffield has rendered. The proposed change in the by-laws by which it would require a referendum vote to validate convention preceedings was defeated, but the proposed change under which only national association members in the State organization would be permitted to vote for the State directors was carried.

The paper on "Liability Insurance and Workmen's Compensation" proved to be one of the most important subjects considered at the convention. After the reading of this paper it was resolved that the association recommend that members carry workmen's compensation insurance, and it was decided that the association should arrange as soon as feasible to secure this for members whenever requested, under the plan which is to place all the business in some form of mutual insurance limited to electrical contractors. It was stated that Tennessee, Illinois and Iowa already have such a plan in effect and that it saves employers just 50 per cent of the premiums.

The board of directors re-elected Messrs. James R. Strong, New York, and E. McCleary, Detroit, for three-year terms on the executive committee. The other officers on this committee hold over. The committees on industrial development, universal data and sales book, national code, membership, legislation, labor and national convention were continued as at present, as were also the officers in the publication and auditing committees. The nominating committee personnel was changed and is now as follows: Mr. Ernest Freeman, Chicago, chairman, and Messrs. W. C. Peet, New York; C. V. Schneider, Sacramento; C. S. Barnes, New Orleans, and Fred Adam, St. Louis.

Protests were received from members who complained that in some cases manufacturers are selling direct to consumers at the same price as to dealers, and from another quarter came the complaint that central-station companies were offering to give prospective customers wiring estimates gratis. In both these cases it was

considered within the province of the association to take the matter up on behalf of the members and to urge their protection.

The executive committee elected Mr. James S. Hilton, Syracuse, permanent chairman of the credentials committee, the other two members to be appointed by the president at the time and place of each convention. Another precedent established by the executive committee was the decision to give free privilege hereafter for the reproduction of N. E. C. A. conduit and wire charts in catalogs, etc. This privilege has often been sought heretofore, but has always been withheld by the association. The next executive committee meeting will be held in Washington, D. C., in October.

Threatened Suit Over Commission Ruling in Washington, D. C.

The Potomac Electric Power Company of Washington, D. C., has served notice on the District of Columbia Public Utilities Commission that unless the commission reconsiders a recent ruling refusing to authorize an issue of bonds desired by the company an appeal will be made to the courts.

The company asked for authority to issue $495,000 bonds, but was granted authority to issue only $79,000, for extensions and betterments. The commission refused to act as to the remainder of the bonds until it obtained information which could not be acquired until a pending valuation is completed. In its letter to the commission the company said that the refusal to approve the bonds discriminates against the company for these reasons:

"Because it draws a distinction between the issuance of bonds to cover capital expenditures voluntarily made by the company to enable it adequately to serve the public and like expenditures made necessary by direction of Congress or the commission; because the law does not require or contemplate any valuation or completion of a valuation of the properties of this company as a condition precedent to action on application for the issuance of bonds, and because all of said expenditures were to enable the company to discharge its duties to the public and are properly chargeable to capital account."

The Washington Railway & Electric Company, which controls the Power company, has taken a similar appeal to the District of Columbia Supreme Court. The Railway & Electric company desired to issue $694,000 bonds, but obtained authority to issue but $353,000, pending the acquisition of information wanted by the commission. The commission is endeavoring to bring about a separation of the two companies.

Reduction in Cleveland Company Rates

The Cleveland Electric Illuminating Company has revised its rates for energy for business and small motor service so as to make them lower in most instances than those of the municipal plant. Where the rate has been 10 cents per kilowatt-hour for the first 36 units, 5 cents for the next 30 units, and 3 cents for all over 66 units, it is now 10 cents per kilowatt-hour for the first 30 units and 2½ cents for all energy used in addition to the minimum.

The new schedule does not apply to residence lighting and, so far as can be learned, there is no intention of changing residence rates until the Public Utilities Commission reports on the physical valuation of the plant.

Allied Interests Seeking Legislation to Standardize A. S. M. E. Boiler Code

As a result of a resolution passed at the Erie (Pa.) convention of the American Boiler Manufacturers' Association, July 21, about twenty representatives of industrial concerns and associations interested in the general adoption of the American Society of Mechanical Engineers' boiler code met at the Waldorf-Astoria, New York City, July 28, and evolved plans for securing $12,000 with which to promulgate the boiler code. An administrative council was organized, with Mr. Thomas E. Durban as chairman, to supervise the expenditure of the money. The council consists of Mr. E. R. Fish, representing the American Boiler Manufacturers' Association; Mr. T. E. Durban, the National Tubular Manufacturers' Association; Mr. C. E. Blake, the insurance companies; Mr. Isaac Harder, Jr., the water-tube boiler manufacturers; Mr. F. W. Herendeen, the National Boiler and Radiator Manufacturers' Association; Mr. H. P. Goodling, the Traction Engine Manufacturers' Association; Mr. D. J. Champion, the material manufacturers and dealers; Mr. John H. Wynne, the locomotive manufacturers, and Mr. M. F. Moore, the steel, low-pressure boiler manufacturers. Four more members will be added to the council to represent the large users' interests (such as central stations), steam-shovel manufacturers, crane manufacturers and hoisting-engine manufacturers. Messrs. Walter Plehn and H. N. Covell are temporarily representing the steam-shovel and hoisting-engine manufacturers. It is expected that a member of the National Electric Light Association will be selected to represent large users.

At the executive meeting held on the afternoon of July 28 it was decided that the allied interests should contribute toward the fund of $12,000 in proportion to the amount by which each would be benefited by standardization of boiler laws. It was decided to call the administrative council the American Uniform Boiler-Law Society.

From the sentiment expressed by those present and from telegrams and letters sent to Chairman Durban by interested concerns which were not represented at the open meeting in the morning, it appears that the majority were willing to contribute toward the fund. Up to the present time shortness of funds has handicapped the promulgation of the code; however, important steps have been taken in this direction. Educational literature has been sent to the governor of every State, with a letter asking for support in the securing of enabling acts which will authorize the administrative council to enforce the A. S. M. E. boiler code. Governors have also been requested to send the names of men who can be interviewed to insure the support of such legislation. In general the letters have had a good reception. Similar educational literature and requests for support have been sent to about 350 persons, not including governors. The co-operation of technical and trade journals has also been solicited.

Mr. Durban urged bringing the A. S. M. E. code to the attention of all legislative bodies, and pointed out that specifications and inspection rules contained therein will reduce the hazard from boiler explosions. Furthermore, Mr. Durban pointed out that the establishment of uniform boiler specifications will permit manufacturers to carry standard stock which can be used in any State in the Union. Where legislatures have not already adopted the A. S. M. E. code it has been because no one interested in it has been on the ground to support it. As all large interests are in favor of uniform specifications and inspection rules, Mr. Durban believes there should be no difficulty in securing legislation in the matter. The "safety-first" movement should help.

Electrical Exports for May

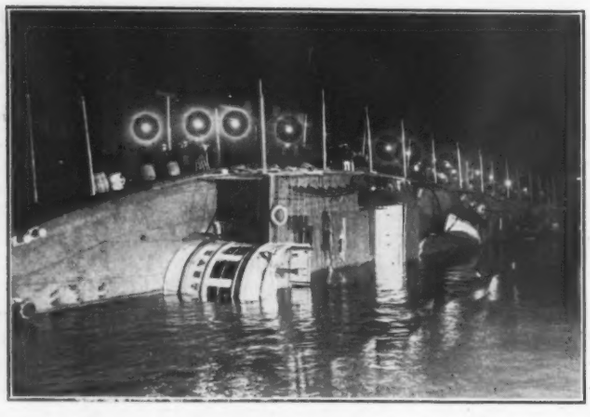
The May exports of electrical goods manufactured in the United States are reported by the Bureau of Foreign and Domestic Commerce as follows:

	May		Eleven Months Ended May	
Articles	1915	1914	1915	1914
Batteries	$79,618	$57,311	$853,196	$627,119
Dynamos or generators	84,153	277,265	1,821,666	2,434,410
Fans	28,838	28,306	210,203	409,939
Insulated wires and cables	302,029	91,528	1,658,603	1,918,010
Interior wiring supplies, etc., including fixtures	131,600	54,983	682,436	669,715
Lamps:				
Arc	1,200	2,754	29,158	72,814
Incandescent:				
Carbon filament	7,593	6,012	90,491	168,970
Metal filament	42,232	12,032	394,613	203,720
Meters and other measuring instruments	67,813	.....	399,702	.....
Motors	269,014	413,214	2,533,820	4,310,538
Static transformers	23,217	49,461	553,940	1,379,951
Telegraph instruments (including wireless apparatus)	2,968	5,069	75,749	109,630
Telephones	57,090	202,979	1,105,019	1,483,234
All other	764,844	839,803	7,316,080	9,822,357
Total	$1,802,209	$2,040,720	$17,724,676	$23,610,407

Western Electric Company Succors Disaster Victims

The daily press has been filled with the details of the appalling catastrophe which occurred last Saturday in Chicago when the steamer Eastland capsized in the Chicago River with many thousand excursionists, chiefly employees of the Western Electric Company. Although the actual number of victims is not yet known, on Thursday morning of this week the known death roll of Western Electric employees was 446, with 289 employees still missing.

Regrettable as was this terrible loss of life, it is comforting to feel that the Western Electric Company, like other large corporations forming part of the electrical industry, has made provision for the relief of the stricken families. On Jan. 1, 1913, a ten-million-dollar fund set aside by the American Telephone & Telegraph Company for pensions, sick benefits and life insurance for the 175,000 employees of the Bell system became available.



ELECTRIC LIGHTING OF THE CAPSIZED EASTLAND

Under the plan inaugurated, the beneficiaries of all employees of more than ten years' standing who die by sickness or accident occurring outside the employment of the Western Electric Company will receive an amount equal to one year's pay, and beneficiaries of those between five and ten years' standing will receive one-half of one year's pay, the maximum payment being $2,000. It is also provided that beneficiaries of all employees killed in performance of work for the company are entitled to three years' wages, the total amount not to exceed $5,000. In addition to the fund that is thus made available, Mr. H. B. Thayer, president of the Western Electric Company, announced a further contribution of $100,000 toward the relief fund. While no figures have been compiled regarding the amount of insurance benefits which will be paid out of the company's fund, a conservative estimate places it at $200,000. It is believed that there were probably a larger proportion of old employees involved in the accident than would have been the case under normal conditions.

The Commonwealth Edison Company responded with its pulmotor crew and life-saving apparatus to the first news of the disaster. Mr. W. L. Abbott, chief operating engineer, was on the ground and took personal charge of the Commonwealth Edison Company's men and machines, which gave a good account of themselves in restoring the apparently drowned. Not a few of the survivors were taken to the Market Street substation of the Edison company, where every possible aid was given them. On the nights of July 24, 25 and 26 the wreck was illuminated by ten searchlamps, six of which were placed along the north edge of the Reid-Murdock factory across the river and four suspended across the channel. Poles hastily erected on the upturned side of the boat also carried lamps, as shown in the accompanying illustration. In order that the divers and others that worked in the interior of the boat might have light, electricians crawled through openings burned with oxy-acetylene torches and installed temporary lighting circuits.

Every office and factory of the Western Electric Company throughout the country was closed on Wednesday as a mark of respect to the dead employees, most of whom were buried on that day.

Real Estate Interests Object to New York Electrical Code

The Advisory Council of Real Estate Interests of New York City, through its industrial code committee, has called the attention of the Mayor of the city to certain features of the proposed electrical code which, in its opinion, are not satisfactory to real estate interests. The proposed code was passed recently by the New York Board of Aldermen, as stated in the ELECTRICAL WORLD for July 10, after Commissioner Williams had held numerous public hearings and conferences with the interests concerned.

At the present time the city accepts certificates of inspection from the Board of Fire Underwriters, but although the proposed code does not specify inspection by the city inspection department in all cases, the real estate interests feel that in time the city might see fit to do all of the inspection work imposed upon the department by statute, instead of permitting a portion thereof to be done by the Board of Fire Underwriters. If this were done, a dual system of inspection and a dual system of fees would be in force, and the real estate interests object to any increase in the number of inspections or fees in connection with building construction. Objection is also raised to the fact that a special license fee of $1 is required of employees in apartment houses, hotels and other buildings where such employees do electrical wiring and make repairs.

CLOSING SESSIONS OF OHIO MEETING

Commercial Side of the Industry and Betterment of Public Relations Discussed at Cedar Point Convention

A report of the news features of the opening sessions of the Ohio Electric Light Association convention, held at Cedar Point on Lake Erie, July 20 to 23, was presented in these columns last week. The session of Thursday morning, the third day of the convention, was opened with Mr. E. Burt Fenton's paper on "Snuggling Up to John Smith," an abstract of which was presented in the preceding issue. Messrs. T. F. Kelly, Dayton; E. W. Doty, Columbus; H. B. Bixler, Akron; T. O. Kennedy, Massillon; D. L. Gaskill, Greenville; W. R. Power, Huntington, W. Va.; F. C. Caldwell, Columbus; A. O. Austin, Barberton, and W. W. Jones, Cleveland, took part in the discussion.

Publicity for the "Public-Be-Pleased" Policy

Mr. Kennedy suggested initiating a publicity campaign throughout Ohio to bring before the local public the corporation ideal that "The public be pleased." It is not enough, said Mr. Kennedy, simply to do the right thing for the public; utility companies must in addition let the public know what they are doing and how they are doing it.

In a vigorous address, Mr. Gaskill urged that utility companies throw off all frills and technicalities in their dealings with the public and that they adopt the give-and-take policy and ask for themselves no better treatment than other business men receive from members of the community. Mr. Gaskill suggested, for example, that the form of blank used in applying for electric service be simplified, to reassure the customer.

The report of the meter committee, which was read by Chairman A. H. Bryant, Cleveland, was discussed by Messrs. William Bradshaw, Pittsburgh; E. A. Wagner, Fort Wayne, Ind.; J. F. Gilmartin, Detroit, Mich.; J. K. Heims, Dayton; L. C. Anderson, Middletown; W. Parsons, Springfield; R. F. Graves, Cincinnati, and Professor Caldwell. Much of the discussion was upon the subject of instrument transformers, the point being emphasized that too often the accuracy of the transformer is overlooked if the meter itself appears accurate on test. Details of the meter rules proposed by the meter committee were also fully discussed.

An address entitled "The World Do Move," by the Hon. Beecher W. Waltermire, chairman of the Public Utilities Commission of Ohio, was the feature of the Thursday afternoon session. Referring to the subject of utility regulation by commissions, the speaker said:

"We should understand that private property is today as sacred and inviolate as it ever was. No man should be compelled to fight against good government or against his State for his rights. We must understand that regulation does not mean management. No State or government has the right to put itself in the position of attempting to manage the property of a utility. Regulation ought to bring about harmony between the public and the utility rather than discord. It is the duty of the commission to bring both the utility and the public to see that their interests are mutual."

New Business and Electric Heating

The report of the committee on new-business co-operation, presented by Mr. T. F. Kelly, Dayton, chairman (abstracted in these columns last week), was discussed by Messrs. J. E. North, Springfield; A. K. Young, Toledo; P. H. Stambaugh, Youngstown; W. B. Wilkinson, Newark; K. Fitzpatrick, Dayton; C. I. Crippen, Wheeling, W. Va.; D. L. Gaskill, Greenville; S. F. Messer, Kent; W. Parsons, Springfield, and C. M. Gilbert, Detroit, Mich.

Mr. H. O. Loebell, industrial heating engineer for H. L. Doherty & Company, followed with a talk on the electric-oven load of the Toledo Railways & Light Company, which will shortly aggregate 20,000 kw. The Overland automobile factory equipment at Toledo was described on page 1702 of our issue of June 26.

By the use of electric ovens in enameling processes, said the speaker, there is less danger of "flashing" and consequently less material is spoiled; hence the manufacturer can well afford to pay a higher price for electric heating than would represent his expenditure for such other fuels, as gas, oil, coke, coal or wood. The objection to all such fuels is that a great portion of the heat must go out in the form of flue gases without doing any good. A large proportion of air must also be added in the furnace in order to produce combustion sufficiently intense to obtain the desired temperature. Convenience and ease of temperature regulation are also important factors which appeal to the manufacturer in favor of his adopting electric heating.

Following the presentation of the brief report of the committee on electric vehicles, of which Mr. C. H. Chappelle, Cleveland, was chairman, Mr. George Drake Smith, Long Island City, N. Y., read a paper on "The Purchase and Care of the Initial Truck," in which he pointed out that far greater efficiency will be obtained in prescribing the type of electric vehicle which a central station should purchase if the company's transportation needs are first analyzed and then just the vehicles necessary to displace existing horse equipment are recommended. Mr. Frederic B. Neely, Philadelphia, also took part in the discussion.

Election of Officers

Herewith is the list of officers and committees of the Ohio Electric Light Association elected to serve during the coming year:

President, Mr. W. J. Rose, Alliance; vice-president, Mr. L. C. Anderson, Middletown; secretary-treasurer, Mr. D. L. Gaskill, Greenville. Executive committee—Messrs. C. V. Hard, Wooster; F. J. Derge, Toledo; O. H. Hutchings, Dayton; Elam Fisher, Eaton; Robert Lindsay, Cleveland. Advisory committee—Messrs. W. W. Freeman, Cincinnati; R. P. Stevens, Youngstown; E. A. Bechstein, Sandusky. Finance committee—Messrs. D. J. Hard, Cleveland; T. O. Kennedy, Massillon; A. L. Thuma, Ironton. Meter committee—Messrs. A. H. Bryant, Cleveland; George F. Snider, Toledo; Ray Wolford, Newark; John K. Himes, Dayton; Adrian Tobias, Youngstown. Editorial committee—Messrs. D. L. Gaskill, Greenville; W. A. Wolls, Columbus; W. J. Rose, Alliance. Illumination committee—Messrs. S. E. Doane, Cleveland; L. C. Anderson, Middletown; F. C. Caldwell, Columbus. Transmission committee—Messrs. M. H. Wagner, Dayton; S. M. Rust, Greenville; H. W. Hough, Cleveland; W. R. Power, Ironton; W. S. Smith, Tiffin. Committee on new-business co-operation—Messrs. J. E. North, Springfield; J. R. McCoy, Columbus; W. A. Wadsworth, Cincinnati; A. K. Young, Toledo; F. C. Morrison, Newark; H. B. Bixler, Akron; H. C. Gillie, Cleveland; W. E. Quillin, Alliance; F. B. Steele, Dayton. Standardization of voltages—Messrs. S. E. Doane, Cleveland; W. C. Anderson, Canton; O. H. Hutchings, Dayton; E. H. Beil, Youngstown; H. L. Wallau, Cleveland. Insurance committee—Messrs. L. K. Funkhouser, Dayton; F. C. Dunbar, Columbus; A. P. Martin, Cleveland. Advertising committee—Messrs. T. F. Kelly, Dayton; W. E. Richards, Toledo; E. A. Bechstein, Sandusky; W. J. Rose, Alliance; R. M. Wright, Cleveland. Station-operating committee—Messrs. Henry B. Dates, Cleveland; W. P. Hurd, Urbana; Thomas B. Coughlen, Scranton, Pa.; William Long, Toledo; N. G. Reinicker, Detroit, Mich.

Miscellaneous News Notes

Electrical Development Jingles.—The Society for Electrical Development, Inc., has issued some jingles for use in central-station sales campaigns.

Increased Zinc-Mining Activities Benefit Central Station.—Owing to the advancing price of ore the zinc-mining industry in the Galena (Ill.)-Platteville (Wis.) territory is becoming exceptionally active and the Interstate Light & Power Company, whose transmission lines traverse the district, has as a result received inquiries for energy to operate a number of new and abandoned mines, one prospective user calling for 350 hp.

Accidents in New York City.—Reports to the New York Public Service Commission, First District, show that in June, 1915, electrical utilities reported injuries to 384 employees, compared with 397 in June, 1914, and to twenty-seven other than employees, as compared with fifty-nine in June, 1914. One person was killed in June, 1915, as compared with six persons in June, 1914. There were only eight serious injuries.

Indianapolis Cluster Standards to Be Removed.—The old clusters in the downtown districts in the city of Indianapolis, Ind., have just been ordered removed by the board of public works of the city. These lamps were purchased some time ago by merchants, and have been kept up by them since. Under the new lighting contract which the city has with the Merchants' Heat & Light Company, the single-lamp type of standard hereafter is to be used on the downtown streets, the company installing the lamps.

A Safety Lamp for the Family Medicine Chest.—Every household medicine chest should be equipped with an electric lamp which will be automatically lighted with the opening of the door, writes Dr. Woods Hutchinson in a recent discussion of the many serious accidents which occur from the careless selection of the wrong medicine from a dark medicine chest. Automatic switches have long been used for closets, cellars, etc., but in the interest of safety, the physician points out, every medicine chest should be so equipped.

Examinations for Massachusetts Wiremen.—The Massachusetts board of examiners of electricians, Mr. David Snedden secretary, Room 428, State House, Boston, will hold examinations on Aug. 11 for the issuance of certificates to master and journeymen electricians, in accordance with Sec. 1, Chap. 296, Acts of 1915. The examinations will be held at Boston, Springfield, Worcester, Fall River, Lowell and Pittsfield. According to the law, no person can engage in commercial wiring after Sept. 1, 1915, without a certificate from the board, of which Mr. John J. Hogan is chairman, Fire Prevention Commissioner John A. O'Keefe of Boston also being a member.

Supreme Court Upholds Going Value as a Property Right.—In discussing the question of going value in the valuation of public utilities for rate-making purposes, the United States Supreme Court said, in deciding the Des Moines gas rate case on June 14: "That there is an element of value in an assembled and established plant, doing business and earning money, over one not thus advanced is self-evident. This element of value is a property right and should be considered in determining the value of the property upon which the owner has a right to make a fair return when the same is privately owned although dedicated to public use. Each case must be controlled by its own circumstances."

Mayor of Cincinnati on Interior Electrical Construction.—Mayor Spiegel of Cincinnati, Ohio, suggests that all interior electrical construction should be under the supervision of the city electrician. He would have the Council make it mandatory that all plans and specifications for public buildings be prepared by or under the supervision of the city electrician. Mayor Spiegel said that he has no intention of interfering with the splendid work of the Cincinnati Fire Prevention Bureau or any of the inspection bureaus, but he believes that the city should take a hand in order to bring electrical construction up to the highest standard, by mandatory means if necessary. The city electrician should be the last authority in electrical construction.

Electricity to Make Oregon Mutton.—The great sheep ranches in the stock-raising regions of Oregon are large consumers of electricity for light and power. Central-station energy is used for pumping in the irrigation districts and for chopping grain for stock feed in the winter. In one of the large stock-raising farms electricity has been put to a novel use for the winter fattening of sheep. The sheep pens are wired and the electric light is turned on during the winter months from 4 p. m. to 9 p. m. Under this artificial illumination the sheep continue to feed until the lights are extinguished. At 4 a. m. the lamps are then again turned on and burn until daylight, and again the sheep feed. In this way the sheep are made to feed during the equivalent of a long summer day, and thus, despite the winter season, are brought quickly to the condition for marketing.

Electrically Bleached Flour Must Be So Labeled.—In a letter sent to Kentucky millers by Mr. R. M. Allen, chairman of the State pure-food commission, which has headquarters at the State experiment station at Lexington, attention is called to the Kentucky law which is interpreted as requiring that millers who bleach flour by the electric or other process must brand it as bleached under the State law, if it is sold only in intrastate commerce, and under the federal pure-food statute if it is sold in interstate commerce. The action of the commission has followed the filing of complaints by millers in other States who compete for the Kentucky trade. These outside millers contend that by being required to brand their flour as bleached they are placed at an unfair disadvantage with the Kentucky millers who do not observe that requirement of the State and federal statutes. Some of the Kentucky millers insist, on the other hand, that the State law does not relate to flour bleaching, but the pure-food commission asserts that the statute's general terms are sufficiently broad to reach this specific case.

An Electroscope in the Rôle of Detective.—Following an all-night application during the treatment of the face of a patient at a Liverpool hospital, the small tube of radium used was in the morning found to be missing. As the radium was valued at $5,000, search was begun immediately, but without result. The tube could not be found in the bedding, and the X-ray showed that it had not been swallowed by the patient. In the fear that the tube had fallen onto the floor and been swept up when the room was cleaned, the wagon containing the sweepings from the institution was held up and a sensitive electroscope was sent for. Bringing this instrument near the wagonload of refuse, the tiny vanes were quickly affected, indicating that the radium was somewhere in the mass of the sweepings. One shovelful at a time, the refuse was then removed from the wagon, and each shovelful was in turn tested by the electroscope. Unerringly, again the vanes responded when the shovelful containing the radium was brought near, and in this lot, when carefully combed through, the missing tiny tube was found.

J. G. White Companies Urge Men to Join Militia.—The movement on the part of large corporations to encourage their employees to become members of the National Guard is increasing, according to the National Security League. The league announced at its headquarters, 31 Pine Street, this week that the J. G. White Companies have taken definite action to co-operate with the league in encouraging employees to join the National Guard. Mr. Gano Dunn, president of the J. G. White Engineering Corporation, in a letter to the president of the league, said: "Arrangements to release men for military service are more difficult for corporations like the White companies because of the highly specialized nature of the engineering and associated work that they carry out, which requires the personal attention of individuals in a way that does not readily permit of the substitution of others to fill their places during absence. Also, as a class, the men are highly salaried men who have particular responsibilities and are scattered over a large territory. It is felt, however, that the sacrifices involved in encouraging these men to enter the National Guard and assuring them of their positions with pay during absence for service in militia, in addition to their regular vacations, are small in relation to the great importance of fostering the spirit of readiness for patriotic defense." The members of the executive committee which took this action in the White companies include Messrs. James Brown of Brown Brothers &

Company; G. H. Walbridge, vice-president of William P. Bonbright & Company; A. G. Hodenpyl of Hodenpyl, Hardy & Company; Frederick Strauss of J. & W. Seligman & Company; W. F. White of the White Investing Company, and H. R. Tobey of N. W. Halsey & Company.

Associations and Societies

Annual Outing of Detroit Edison Company Employees.—Nine hundred employees of the Edison Illuminating Company of Detroit, Mich., held their annual excursion to Bois Blanc Park on Thursday, July 22. The day was spent in field sports, dancing and athletic games. The trip to the park was made on the steamer Pleasure.

Brooklyn Electrical Contractors Hold Outing.—The Kilowatt Club of Brooklyn, N. Y., which is made up of local electrical contractors, enjoyed its third annual outing on July 17. Among the entertainments of the day were bowling and athletic contests and a baseball game. After the game dinner was served to more than 300.

American Association of Engineers.—The American Association of Engineers is the name of a new organization formed in Chicago and having as its purpose the raising of standards of ethics in the engineering profession and the promotion of the economic and social welfare of engineers. Mr. Arthur Kneisel, patent attorney, is secretary. The new association's headquarters are at 29 South LaSalle Street, Chicago.

Cool Luncheons for Louisville Jovians.—At their weekly luncheons the Louisville Jovians have adopted the plan of serving a cold bite and a salad, instead of the hot dishes which are now less popular than they were in the winter months. The first of the meetings on the new plan was held on Tuesday, July 27, when the attendance was doubled. Mr. A. T. Macdonald, former publicity man for the old Louisville Lighting Company, was present and addressed the members of the club.

Duquesne Company Employees Give Lawn Fete.—The monthly meeting, July 20, of the Duquesne Light Company Section of the National Electric Light Association, Pittsburgh, Pa., took the form of an open-air fête held on the Hotel Schenley lawn, Pittsburgh. Photoplays and dancing provided the entertainment for the evening. About 150 were present. The committee in charge of the affair consisted of Messrs. William J. Hartigan, chairman; George B. Confer, C. H. Kennedy, W. M. Collins and E. M. Hall.

Growth of National District Heating Association.—The Chicago convention of the National District Heating Association in June had a larger attendance—260—than any annual session previously held by the association. Seventy-two district-heating plants were represented. The society's first convention, held at Columbus, Ohio, in 1909, was attended by forty-two persons; the second, at Toledo, in 1910, by ninety-four; at Pittsburgh in 1911, by 104; Detroit, 1912, 174; Indianapolis, 1913, 154; Rochester, 1914, 176, and Chicago, 1915, 260.

Southeastern Section, N. E. L. A., at Asheville, N. C.—For the annual convention of the Southeastern Section of the National Electric Light Association, to be held at Asheville, N. C., Sept. 22 to 24, the following program of papers has been announced: "Accounting," by Mr. A. A. Wilbur, Columbus, Ga.; "Advertising and Its Direct Relation to the Central-Station Field," by Mr. J. J. McManus, Harrison, N. J.; "Electric Heating Devices," by Mr. W. H. Stearns, Pittsfield, Mass.; "Distant-Control Switchboard Design," by Mr. T. W. Fuller, Atlanta, Ga.; "Electric Power for Driving Textile Mills," by Mr. H. A. Orr, Anderson, S. C.; "Efficiency in Serving the Consumer," by Mr. J. H. Mohl, Cordele, Ga.; "The Sale of Energy to Municipally Owned Systems of Street Lighting," by Mr. W. Rawson Collier, Atlanta, Ga., and "High-Tension Systems and Their Operation," by Mr. W. E. Mitchell, Birmingham, Ala. At the close of the first day's sessions a barbecue will be tendered the delegates by the Asheville Board of Trade. On Thursday evening a public-policy session will be held, the feature of which is expected to be an address by the Governor of the State. Entertainment and dancing will follow.

Public Service Commission News

Indiana Commission

Patrons of the Winona Electric Light & Water Company of Winona Lake, Ind., have been notified by the commission that they must pay for light and water hereafter by meter measurement instead of on a flat-rate basis. The change was made, according to the order, because of waste in using the service on the flat rates.

District of Columbia Commission

The commission has served notice on the Washington Railway & Electric Company and the Potomac Electric Power Company that a public hearing will be held soon to determine the cost of electrical energy furnished to the railway company by the power company as compared with the cost of energy furnished to householders and other private consumers in Washington. This is an additional step in the fight by Washington officials to separate the two companies. The Railway & Electric company owns a controlling interest in the power company. Many subsidiary lines of the railway company are furnished with energy by the power company.

Idaho Commission

The Great Shoshone & Twin Falls Water Power Company has made application to the Public Utilities Commission through its receiver, Mr. William T. Wallace, for an increase in the rates for electricity used for all classes of air-heating service, whether by means of electric air heaters or by means of steam or hot-air heating plants. The company desires to establish a new rate of schedule increasing the rate for electricity in Shoshone, Twin Falls, Wendell and other places in the district covered by the company's transmission lines. The present rate is held by the company to be unreasonable and low, and does not, it declares, furnish a reasonable and adequate return.

The application of the company says in part: "The furnishing of electricity for air-heating service is possible only because the company now has station capacity and distribution equipment available during the winter months for the use of which no remunerative service can at present be obtained."

Massachusetts Commission

An index-digest of laws relating to various gas and electric companies under the jurisdiction of the Massachusetts Gas & Electric Light Commission has been prepared by Mr. Thomas P. Riley of the board. Each section of the statutes has been analyzed and digested separately, and then rearranged in charts according to the respective divisions, besides being indexed. The analytical subdivisions are arranged in part to meet the convenience and necessities of the commission and those who resort to it for information concerning the laws. Thus the Board of Gas and Electric Light Commissioners act, the Boston Consolidated Gas Company act, the gas and meter inspection act, the sliding-scale act, and the uniform stock-transfer act are all complete, and while thorough cross-references are printed in other parts of the digest, these acts may be consulted without reference to them.

New Jersey Commission

The board has refused the application of the Ocean County Gas Company to issue $20,000 stock and transfer $12,680 stock of the Tuckerton Gas Company, holding that this would be in contravention of the statutory provisions governing the capitalization of corporations. The board says that it is difficult to perceive how officers of the Tuckerton company can justify the sale of upward of $26,000 stock for $13,000 cash and then approve the issue of $20,000 stock in exchange for $12,680 stock of a company whose stock was of doubtful value. The board points out that the Ocean company should have taken steps immediately to secure the bonds purchased in its behalf, if the transaction was to have the note of sincerity, and that it is the duty of the Ocean company to straighten out this transaction immediately, to the end that if the control or ownership of the Tuckerton company is to be acquired it shall be upon a just and proper basis; this the board will expect to be done.

Personal

Mr. J. H. Mitchell has been appointed manager of the new-business department of the East St. Louis (Ill.) Light & Power Company.

Mr. A. Larrowe, who served as construction engineer of the Bath (Maine) municipal electric lighting and power plant, has been engaged as superintendent of the plant.

Mr. Claude Thorpe has been appointed manager and contract agent of the Collinsville (Okla.) Municipal Water & Light Department to succeed Mr. Herman B. Schwartz.

Mr. Thomas A. Sullivan, formerly vice-president of the Attica (N. Y.) Water, Gas & Electric Company, has succeeded Mr. E. McM. Mills as president of the company.

Mr. H. B. Akin, formerly superintendent of the Waukesha (Wis.) Gas & Electric Company, has been promoted to the management of the company, succeeding Mr. R. C. Stull.

Mr. L. M. Willey has been appointed successor to Mr. Robert Montgomery as manager of the contract department of the Fort Worth (Tex.) Power & Light Company.

Mr. R. Gilmir has been appointed successor to Mr. W. A. Hobbs as superintendent and engineer of the power station of the Council Grove (Kan.) Ice, Light & Power Company.

Mr. R. W. Muzzal has succeeded Mr. H. J. Willis as superintendent and engineer of the power station of the Scott City (Kan.) municipal electric light and water plant.

Mr. John R. Galloway, who was unanimously re-elected president of the National Electrical Contractors' Association at the time of the latter's annual convention in San Francisco last week, has served the contractors' organization in official capacities for many years, having acted as treasurer of the association during the last eleven years prior to his first term as president of the body in 1914. Mr. Galloway was born in Baltimore County, Md., Oct. 17, 1852. After receiving his early education in the city of Baltimore, Mr. Galloway entered the hardware business there, but in 1875 he moved to the neighboring city of Washington, D. C., where he entered the field of electrical contracting and construction work. Many of the finest buildings in the capital are equipped with mechanical and electrical apparatus installed under Mr. Galloway's supervision. Mr. Galloway has served also as president of the Washington Builders' Association, as well as president of the National Association of Builders.

J. R. GALLOWAY

Mr. O. W. Jones, formerly engineer of distribution for the Columbus (Ohio) Railway, Light & Power Company, has been appointed superintendent of meters and of the distribution department of the Columbus company.

Lieut. P. W. Foote, who for the last three years has been stationed at the Schenectady plant of the General Electric Company in connection with work for the United States Navy, has been ordered to sea duty. Lieutenant Foote is succeeded at Schenectady by Lieut. C. C. Mosher, U. S. N.

Mr. George L. Kelly, the secretary of the recently completed merger of the Rauch & Lang and Baker electric automobile companies, now the Baker R. & L. Company, Cleveland, Ohio, is the president-elect of the Electric Automobile Manufacturers' Association, whose annual meeting was recently held at Cleveland.

Mr. John E. Ryan of Bend, Ore., has been elected vice-president of the Bend Water, Light & Power Company, to succeed Mr. J. P. Keyes, whose resignation was recently accepted. Other officers elected were Mr. C. A. Brown as president and Mr. K. B. Miller as secretary. The board of directors consists of those above named and Messrs. T. H. Foley and V. A. Forbes.

Mr. Ward Barnum has resigned as electrical engineer of the Louisville & Nashville Railroad to become electrical engineer for the Interstate Commerce Commission. Mr. Barnum is a graduate of the electrical engineering course of Cornell University, and was for two years a member of the staff of the Arnold Company, Chicago. Later he became an instructor in Lewis Institute, and for three years he served as superintendent of the Union Light & Power Company, Covington, Ky. For the last eleven years he has been electrical engineer for the Louisville & Nashville Railroad.

Mr. W. J. Rose, who was elected president of the Ohio Electric Light Association at the time of its convention at Cedar Point, Ohio, last week, as noted on a preceding page, is the general manager of the Alliance (Ohio) Gas & Power Company, which furnishes central-station service in Alliance. Prior to becoming connected with the Alliance company, which is one of the properties operated by Henry L. Doherty & Company, Mr. Rose was foreman on distribution work for the East Ohio Gas Company at Cleveland. Resigning his position there about nine years ago, he was appointed general superintendent of the Alliance company, and after six years was promoted to the position of manager, which he has held for three years. Mr. Rose has been very active in the work of the Ohio association, has rendered valuable service on several committees, and was last year vice-president of the association. The president-elect is a graduate of the mechanical and civil engineering courses of Columbia University, New York City. He has been president of the Alliance Board of Trade and was one of the organizers of the Alliance Advertising Association, which he served as a director for two years. He is a member of the executive committee of the Alliance Chamber of Commerce and a director of the Alliance Country Club.

W. J. ROSE

Mr. George H. Duffield, secretary of the National Electrical Contractors' Association, was, during the recent contractors' convention at San Francisco, presented with a handsome silver-mounted cane by President J. R. Galloway in recognition of Mr. Duffield's services to the organization. Mr. Duffield is a native of Clayton, N. J., and is a graduate of the Drexel Institute, Philadelphia, Pa. He first entered the electrical field in the employ of the Public Service Corporation of New Jersey, later accepting a position with J. G. White & Company as construction electrical engineer. During the construction of the electrical controlling apparatus of the Mississippi River lock at the Rock Island Arsenal, Mr. Duffield represented the United States government as engineer. Leaving the government employ, he next became associated with Mr. J. T. Marron, the electrical contractor and manufacturer of Rock Island, and was placed in charge of the manufacturing end of the business conducted by the Tyro Electrical Manufacturing Company of Rock Island. Resigning, he accepted a position as special representative of the National Electrical Contractors' Association, which he held for three and one-half years, and twelve months ago he was appointed secretary of the association.

G. H. DUFFIELD

Mr. Frank E. McCall has been appointed secretary of the newly organized Associated Garages of Chicago, an association composed of members of the Chicago Garage Owners' Association and the Electric Garage Owners' Associa-

tion of Chicago. For the last two years Mr. McCall has served capably as the local secretary of the Chicago Section of the Electric Vehicle Association of America. He is a graduate of the University of Nebraska, and prior to joining the sales staff of the Commonwealth Edison Company of Chicago on special electric automobile work was employed by the Minneapolis General Electric Company, Minneapolis, Minn., and by the Cosmopolitan Electric Company of Chicago, which was later absorbed by the Commonwealth Edison Company.

Mr. H. A. Wagner, the first vice-president of the National Electric Light Association, is the president of the Consolidated Gas, Electric Light & Power Company of Baltimore, Md. Born in Philadelphia, Feb. 24, 1867, Mr. Wagner was graduated from Stevens Institute at the age of twenty with the degree of mechanical engineer. From 1889 to 1900 he acted as general superintendent of the Missouri Electric Light & Power Company and of the Missouri Edison Electric Company of St. Louis, Mo. In addition, in 1891 he established the present Wagner Electric Manufacturing Company of St. Louis and conducted this business until 1899. In connection therewith he took out patents on various devices referring to alternating-current transformers and motors. From 1900 to 1901 he was president of the Mississippi Valley Automobile Transportation Company. He was retained as an expert witness by the Stanley Electric Manufacturing Company in its litigation with the Westinghouse company, involving the Tesla polyphase patents. In connection with Mr. D. W. Roper Mr. Wagner took out a patent in 1899 for an arc-lamp controller for operating arc lamps on constant-potential circuits whereby the efficiency of distribution is increased and the cost of production reduced. Prior to his connection with the Baltimore utilities company in 1908, Mr. Wagner engaged in consulting engineering work, particularly in the electrical field, in both St. Louis and New York. In 1908 he undertook the direction of the electric division of the Consolidated Gas, Electric Light & Power Company of Baltimore, and in 1911 he was elected a vice-president of the company, subsequently being appointed president.

H. A. WAGNER

Mr. Charles W. Whiting has been appointed temporary manager and consulting engineer of the Chicopee (Mass.) municipal electric lighting plant and will reorganize the installation during the next few months. Mr. Whiting was graduated from the Stevens Institute of Technology in 1884 and soon afterward entered the employ of the Philadelphia & Reading Railroad, later joining the staff of the Calumet & Hecla Mining Company. He was next employed by the E. P. Allis Company at Milwaukee, Wis., and for about four years was works manager of a large English manufacturing plant. Returning to the United States, he entered business as a consulting engineer, with offices in Boston, Mass., and has since been active in the rehabilitation of municipal electric-lighting plants at Marblehead, Westfield, Taunton, Holyoke and elsewhere. About five years ago Mr. Whiting served the city of Chicopee as consulting engineer, and upward of $100,000 was expended upon the local plant at that time in accordance with his recommendations.

Mr. Day Baker, New England manager of the General Vehicle Company, Boston, Mass., has been appointed manager of agency sales, foreign sales, and of the central-station department of the company. Mr. Baker is a well-known figure in the electric-vehicle industry and has a national reputation as a sales engineer, lecturer and writer upon the applications of the electric truck in modern industry. Mr. Baker's earlier years were devoted to the printing-press industry, where a natural interest in machinery and marked commercial abilities afforded him preparation for his subsequent career. When he decided to enter the electric-vehicle field some eight years ago, many of his friends expressed the opinion that perhaps he had made a mistake in becoming identified with the electric vehicle instead of the gasoline truck, but Mr. Baker's remarkable success in his New England work has shown the wisdom of his decision. In co-operation with the Boston Edison company's campaign for intensive electric-vehicle development, Mr. Baker has literally worked day and night to establish electric truck and pleasure-car service on a sound basis in the Metropolitan territory. Since its organization he has been treasurer of the Boston Commercial Motor Vehicle Association; for four years he was president of the Electric Motor Car Club of Boston, and for three years he was treasurer of the Electric Vehicle Association of America. He is a member of the Boston Chamber of Commerce, the Engineers' Club of Boston, the National Association of Cotton Manufacturers, the National Electric Light Association and many other organizations.

Obituary

Jordan L. Mott, president of the J. L. Mott Iron Works, Trenton, N. J., manufacturers of ornamental lighting posts and fixtures, died at his home on Fifth Avenue, New York City, July 26, at the age of eighty-six. Mr. Mott was in 1853 admitted to the business founded by his father, and in 1866 took entire charge. Ten years ago he moved the factory from Mott Haven, N. Y., to Trenton, N. J. Mr. Mott was a member and president of the Board of Aldermen of New York City in 1879 and at one time served as a member of the rapid-transit commission which supervised the construction of the elevated railroads of the city. For the last ten years he had devoted his attention to his art collection.

George R. Stetson, who retired a few years ago as president and general manager of the New Bedford (Mass.) Gas & Electric Company, died at New Bedford July 27, at the age of seventy-eight years. Having served for twenty years as president of the New Bedford company, Mr. Stetson was a familiar figure in New England central-station circles. Although advanced in age in recent years, he was a regular attendant at conventions of the National Electric Light Association, both annual and sectional. He was a valued contributor to discussions, and, owing in large measure to his early mechanical training, had a keen appreciation of the engineering side of central-station work, no less than of its financial aspects. Mr. Stetson was born in Brooklyn, N. Y., in 1837, and after learning the machinist's trade was employed in the manufacture of rifles for some years. He was in charge of the establishment of the small-arms plant of the Brazilian government during the war between Brazil and Paraguay, with headquarters at Rio de Janeiro. In 1873 he took up his residence in New Bedford, and soon became a factor in social and political affairs. He served on the Board of Aldermen and on many important commissions, and for several years was president of the Board of Trade. In 1891 he was elected president of the New Bedford Co-operative Bank, and he held that office at the time of his death. Mr. Stetson became president of the Edison company in 1890, leaving the Morse Twist Drill & Machine Company to take up electrical development in the city. The progress of the Edison company was largely under Mr. Stetson's personal direction until his resignation about three years ago, and to his interest in the electric vehicle the company owes a progress in this branch of electrical service unusual in a central station of its size. Mr. Stetson was a member of many organizations and was keenly interested in the affairs of the Massachusetts Electric Lighting Association and in everything pertaining to the welfare of the industry. He is survived by his widow and four children.

G. R. STETSON

Corporate and Financial

Consumers' Power Company, Jackson, Mich.—The Michigan Railroad Commission has authorized the company to become incorporated in Michigan and issue $32,500,000 securities, following the appraisal of the properties by Dean Cooley of the University of Michigan. The Consumers' Power Company was formerly a Maine corporation, controlling the Commonwealth Power Company, Jackson, Mich. Dean Cooley appraised the properties at $32,814,000.

Detroit (Mich.) Edison Company.—The company, which was incorporated in January, 1903, under New York State laws, was incorporated recently under Michigan laws. The company holds control of the Peninsular Electric Light Company and the Edison Illuminating Company of Detroit, the operating companies. The New York company will continue to exist and will be one and the same with the Michigan company. No changes are contemplated by the action. Besides the two companies above mentioned, the Detroit Edison Company controls the Eastern Michigan Edison Company (a New York corporation), the Central Heating Company, the Murphy Power Company, the Delray Terminal Railroad, and two companies not actively engaged in business.

Kansas City (Mo.) Railway & Light Company.—The protective committee for the 6 per cent five-year collateral gold notes due on Sept. 1, 1912, has extended until Aug. 15, 1916, the time within which depositors of these notes will be entitled either to receive new securities or cash, pursuant to a plan of reorganization or a sale, or to the return of the deposited notes.

Pacific Gas & Electric Company, San Francisco, Cal.—The company has issued the following statement for the twelve months ended June 30:

	1915	1914
Gross operating revenue:		
Electric department	$9,300,731	$8,480,476
Gas department	7,288,448	6,803,544
Other departments	1,098,694	1,129,557
Total gross operating revenue	*$17,687,873	*$16,413,577
Expenses:		
Maintenance, operating and general	$7,996,448	$8,284,082
Taxes	774,863	721,600
Reserves for casualties and uncollectible accounts	220,500	166,500
Reserve for depreciation	1,100,000	1,231,231
Total expenses	$10,091,811	$10,403,413
Net earnings from operation	$7,596,062	$6,010,164
Add profits on merchandise sales and other miscellaneous income	330,008	329,472
Total net income	$7,926,070	$6,339,636
Bond interest	3,916,535	3,842,128
Balance	$4,009,535	$2,497,508
Interest on one-year notes and floating debt (temporary)	227,311	284,638
Balance	$3,782,224	$2,212,870
Apportionment bond discount and expense	$150,092	$147,842
Apportionment note discount and expense (temporary)	169,277	251,074
Total discount and expense	$319,369	$398,916
Surplus	$3,462,855	$1,813,954
Dividends:		
First preferred	$159,517	.....
Original preferred	600,000	$600,000
Total	$759,517	$600,000
Surplus unappropriated	$2,703,338	$1,213,954

*Includes $388,307 in dispute, account rate litigation in 1915, and $628,482 in 1914.

Pacific Lighting Corporation, Los Angeles, Cal.—A statement concerning the company made by Mr. John Nickerson, Jr., of New York, says in part: "The company's total capitalization, including the par value of stocks and bonds outstanding, is considerably less than the depreciated value of its property. The properties have been in charge of one management for twenty-six years. The ratio of gross earnings to total capitalization is very favorable to this company. The gross earnings in 1914 were $4,433,460, and the total capitalization was $17,187,500."

Tulare (Cal.) County Power Company.—The California Railroad Commission has authorized the sale of the company's properties to the Mount Whitney Power & Electric Company for $550,000.

United Light & Railways Company, Grand Rapids, Mich.—On July 17 holders of $1,617,300 of second preferred stock had converted their holdings into first preferred 6 per cent cumulative stock according to the plan announced two months ago. The second preferred stock outstanding before the exchange privilege was offered amounted to $2,108,700. A balance of $491,400 remains unexchanged. The privilege lasts until Aug. 15, when the company may exercise the right to designate whether stock still outstanding at that date shall be converted into first preferred or common stock. The company made large increases in its sales of energy for motor service during the first half of the year. The increases have been especially favorable at Mason City, Iowa, and Laporte, Ind., with the Tri-City Railway & Light subsidiaries. The increases in sales for motor service during the first six months of the year over the corresponding period in the previous year are shown herewith:

	1915	1914
Kilowatt-hour sales—all motor service	20,481,681	18,975,090
Increase, 1915 over 1914	1,506,591	.....
Kilowatt-hour sales for railway motors	10,241,578	10,453,565
Decrease, 1915 over 1914	211,987	.....
Net kilowatt-hour sales—industrial motor service	10,240,103	8,521,525
Increase, 1915 over 1914	1,718,578	.....

J. G. White & Company, Ltd., London, England.—At the annual general meeting Mr. J. Beaver White, the chairman, said in part: "The effect of the war has been very serious. Considering the character of the business, and being as we are largely dependent on the development of new enterprises for additional contracts, we are to be congratulated on being able to meet you to-day under as favorable conditions for the company as are shown by the accounts. When the war began in the early part of last August the necessity of doing everything possible to conserve the resources of the company became at once evident. If the company was to withstand a possible long period of comparative inactivity, to meet promptly its commitments and obligations, when, on the other hand, it might not be able to secure the payment of accounts for materials furnished and work done on all contracts in hand, then not only would it be necessary to watch carefully over the liquid resources of the company, but also to institute economies wherever possible. It was for this reason that the directors decided not to pay an interim dividend at the end of December last. Economies were instituted as early as August by the directors responsible for the management of the company, starting by imposing upon themselves a large reduction in fixed salaries, although these salaries were already small in view of the fact that such directors are largely paid by participation in profits. The members of the staff also accepted reductions in their salaries. Although a number of the staff have enlisted, they are receiving allowances, and their places, in so far as it is possible, are being held open for their return. Other economies have been effected; so that, while the war has been in progress for seven months out of the total year covered by the accounts, yet expenses have been reduced by 32 per cent of those for the preceding year. The work in some branches, especially in the operating department, which has charge of the various companies for which we act as managers and engineers, has been increased owing to the difficulties of transportation, securing supplies and staff. We have made a profit of £19,772, against £70,387 in the preceding year. We are recommending a dividend of 6 per cent. If our resources had been more liquid we could have made a larger distribution. The item 'percentage of profit to staff and directors,' which absorbed last year £7,504, has disappeared. We have realized some of our investments, which has been done at a profit. We believe that the business of the current year will meet all expenses and leave a substantial profit. As to anything beyond that period, it is difficult to forecast, but the directors see no reason why the company should not continue its successful career."

Wisconsin Gas & Electric Company, Kenosha, Wis.—The company has been authorized by the Wisconsin Railroad Commission to issue $657,500 stock. The company will acquire the Watertown Gas & Electric Company property subject to $160,000 underlying bonds, the properties of the Burlington Electric Light & Power Company, and discharge $162,500 floating debt, incurred in making additions and extensions.

Manufacturing and Industrial

The B. F. Goodrich Company, Akron, Ohio, manufacturer of rubber goods, has appointed Mr. Thomas L. Barnes, heretofore Eastern sales representative of its insulated-wire department with headquarters at 1780 Broadway, New York, to be general manager of sales for its insulated-wire department, with headquarters at Akron, Ohio.

Well Stocked with German Electrical Instruments.—James G. Biddle, 1211 Arch Street, Philadelphia, Pa., reports that he is carrying a substantial stock of certain kinds of electrical instruments made by the German firm of Siemens & Halske, A.G. Among these instruments is a line of accurate direct-current portable millivoltmeters with shunts and multipliers.

Electric Furnace for Melting Brass.—The Snyder Electric Furnace Company, 53 West Jackson Boulevard, Chicago, Ill., has recently received an order from the Chicago Bearing Metal Company, Chicago, Ill., for an electric furnace for melting brass with a twelve-hour rating of 5000 lb. The furnace will be designed to operate so that the losses by volatilization will not exceed 1.5 per cent.

Gold Medal Award for Non-Metallic Conduit.—The Tubular Woven Fabric Company, Pawtucket, R. I., for which Mr. A. Hall Berry, 99 Warren Street, New York, is general sales agent, has been granted a gold medal (highest award in its class) for its flexible non-metallic conduit called "duraduct" by the International Jury of Awards of the Panama-Pacific International Exposition at San Francisco.

Fort Wayne Works of General Electric Company.—Mr. X. J. Divens has been appointed advertising manager of the Fort Wayne Electric Works of the General Electric Company, Fort Wayne, Ind., succeeding Mr. C. D. Wheeler, who recently resigned to become advertising manager and assistant sales manager of the Santo Manufacturing Company. Mr. Divens has been a member of the advertising department of the Fort Wayne Works for several years.

Santo Manufacturing Company, Philadelphia, Pa.—Mr. C. D. Wheeler, advertising manager of the Fort Wayne Electric Works of the General Electric Company, Fort Wayne, Ind., for the past six years, has been appointed advertising and assistant sales manager of the Santo Manufacturing Company, Philadelphia, Pa., manufacturer of electric vacuum cleaners of the stationary, portable and small-sweeper types. Prior to entering the technical advertising field Mr. Wheeler was connected with several different advertising agencies in Chicago.

Westinghouse Company Receives New Contract for Rifles.—Mr. Guy E. Tripp, chairman of the board of directors of the Westinghouse Electric & Manufacturing Company of East Pittsburgh, Pa., has confirmed the reports, it is stated, that negotiations are being made with representatives of the Allies for a new order for rifles. It is said that 800,000 rifles will compose the new contract, which will be in addition to the 1,000,000 rifles contracted for last month. It is estimated that the total of the Westinghouse contracts for arms and shells received since the war began is $80,000,000.

Prospects for American Electrical Goods in China.—The Chamber of Commerce of Pittsburgh, Pa., has been advised that, as a result of the visit to Pittsburgh last May of the honorary commercial commissioners of the Chinese Republic, arrangements have been made whereby British and American electrical goods will be sold in China on a basis of equality. Mr. David Z. T. Yui, secretary of the commission, said that heretofore Chinese houses have been familiar only with the British products. The visit of the commission to the plant of the Westinghouse Electric & Manufacturing Company at East Pittsburgh, Pa., was a revelation to the Chinese business men, and in consequence, it is declared, they will recommend that much of the business which has heretofore gone to British manufacturers be given to the Westinghouse company. Mr. Chenk Hsun Chang, president of the commission, was particularly anxious to learn of the facilities of the company for supplying the Chinese trade.

Federal Electric Fans Aid Louisville's Merchants' Sale.—The electric fan as an inducement to customers to attend a clearance sale of women's clothing was recently demonstrated in the women's wear store of H. P. Selman & Company, one of the leading houses in its line in Louisville, Ky. Featured in all the store's advertising was the statement, with drawings of fans in action, that the Selman company was using 100 additional powerful desk fans to make the patrons of the company comfortable. The slogan of the sale, which was also used effectively, was "Economy with comfort." As it happened, the weather turned hot overnight and the fans proved themselves exceedingly worth while. The hundred fans were installed in addition (and it was so stated) to the fifty-six similar fans used by the store, which also has in use a number of large exhaust fans. The fans were supplied by the Federal Sign System, Electric, under an arrangement by which the "Federal fans" received publicity, through the use of the trade mark and the name on the fan, in the merchants' advertising.

Washer Company's Selling Methods.—Mr. H. L. Barker, general manager of the Nineteen Hundred Washer Company, Binghamton, N. Y., manufacturer of electrically operated and hand-operated washing machines, informs the ELECTRICAL WORLD that his company is disposing of some 60,000 machines a year. Of this number, about one-half are sold through its mail-order department, and of the remaining 30,000 about 50 per cent are sold through specialty houses which usually handle washing machines and vacuum cleaners exclusively. The greater portion of the remainder is sold through the hardware trade. Mr. Barker declares that only a comparatively small number of his machines are sold to the department stores. The department store has never been dealt with successfully by his company, he declares, because the price of the machines is not subject to reduction. Mr. Barker asserts that the manager of the average department store likes to get hold of an advertised article and sell it at a cut price, in order that the store may give the impression that it is selling goods at prices lower than its competitor.

Duncan Electric Company Purchases New Plant.—The Duncan Electric Manufacturing Company, Lafayette, Ind., has purchased the plant formerly owned by the Sterling Telephone Company. The new property consists of a city block and will provide a floor space for manufacturing purposes of approximately 150,000 sq. ft. The plant is being thoroughly remodeled and brought up to date. The old windows are being removed and new ones inserted to fill up the entire space between the pilasters, thereby affording the interior an abundance of light. A new power plant is being installed which will include a 500-hp. turbine and three new Sterling water-tube boilers. As soon as arrangements can be made, all of the meter work now being done in the present Duncan factory will be performed in the new quarters, and the company's transformer work will be carried on in that part of the plant heretofore used for meter work. The business of the Duncan Electric Manufacturing Company has been increasing very rapidly, and in the past year the number of meters and transformers shipped to foreign countries has been large.

Pittsfield (Mass.) Branch of General Electric Company Active.—In a recent interview, Mr. C. C. Chesney, general manager of the Pittsfield (Mass.) works of the General Electric Company, stated that improved conditions are being noted in various departments, with the exception of a slowing down in fan-motor manufacture, which is a seasonal matter. The company is engaged in filling an order for tools and dies for use in the manufacture of war munitions by concerns in the East which are unable to produce the necessary equipment in their own plants. This order will keep the toolmakers busy until November. Mr. Chesney denied that any shrapnel or other forms of explosive material were being made at Pittsfield, but the local plant will get its share of the work if the British government places an anticipated large order with the General Electric Company. The highest grade of skilled labor is required in filling the tool contract above mentioned. "General conditions about the plant are good," said Mr. Chesney, "and a large transformer order is being filled for Russia. A large order from China for electrical equipment is shortly expected. About 4500 persons are now on the local payroll, although all are not yet working full time."

Gold Medals for Suction Sweeper.—The Hoover Suction Sweeper Company, New Berlin, Ohio, has been the recipient of three gold medals during the past year for its combined electrically operated carpet sweeper and vacuum cleaner. The latest prize was awarded by the International Jury of Awards of the Panama-Pacific International Exposition. The two other medals were received from the Anglo-American Exposition at London, England, and the Taisho Exposition at Tokio, Japan.

Establishing Business Relations in South America.—Mr. W. E. Leigh, manager of the Buenos Aires branch of the Western Electric Company of New York, declares in the July issue of *The Americas*, published by the National City Bank of New York, that the United States, its people and many of their products are already very well known in South America, and that while present conditions are not good, there is nevertheless great promise for the future. Furthermore, there are to-day, he continues, many strong firms and companies which, although their demand for goods is decreased at present, are able and willing to pay promptly for such goods as they require. The best way to get down to the essential facts regarding the South American countries, Mr. Leigh declares, is to visit the places in which one expects to do business. He suggests that the aspirant for new markets will do well to select and to read as many of the reports that have been issued by the United States government, the Pan-American Union and various banks and commercial bodies as time will permit. In selecting a man to make the trip to South America, Mr. Leigh urges that the commissioner be one of the best business men available, not necessarily, however, the one with the best knowledge of Spanish or Portuguese. This man should take orders if he can, but the object of the first visit should be to build safely for the future. Having decided that there is business to be done and its approximate volume, Mr. Leigh points out that the next problem is how to conduct it. If the possibility of sales and gross profits will warrant the expense and the investment, the most satisfactory way is to establish a branch office. Expenses are generally higher in South America, and it will cost about twice what it does to run a similar office in the United States. On the other hand, gross profits are generally higher. If it is decided to carry stocks locally, these, as a rule, will have to be about two or three times as large as those for a branch office doing a similar volume of business in the United States, on account of the time required to obtain deliveries. If it is not commercially possible to have an individual local branch, then the next best solution, Mr. Leigh declares, is a combination branch with manufacturers of allied but non-competing lines. If neither of the above is possible, the next best arrangement will be a good local agent. But the manufacturer should be sure that such an agent is a good one. On no account should he be appointed by mail or without seeing his place and manner of doing business—unless, of course, it is possible to obtain otherwise such complete and reliable information as will leave no doubt about his ability to develop the business to the maximum.

NEW YORK METAL MARKET PRICES

	July 20 Selling Prices Bid	Asked	July 27 Selling Prices Bid	Asked
Copper	£ s d		£ s d	
London, standard spot*	74 10 0		72 5 0	
Prime Lake	19.25	to 19.50	18.50	to 19.00
Electrolytic	18.87½	to 19.12½	18.25	to 18.50
Casting	17.37½	to 17.62½	17.00	to 17.25
Copper wire base	20.50†		20.00†	
Lead	5.75		5.75	
Nickel	50.00	to 52.00†	50.00	to 52.00†
Sheet zinc, f.o.b. smelter	27.00†		24.00†	
Spelter, spot	20.25	to 20.75†	18.50	to 18.75†
Straits tin	36.50		36.00	
Aluminum, 98 to 99 per cent	32.00	to 33.00	32.00	to 33.00

***OLD METALS**

Heavy copper and wire	17.00	16.50
Brass, heavy	12.00	11.75
Brass, light	10.00	10.00
Lead, heavy	5.00	4.75
Zinc, scrap	15.00	14.00

***COPPER EXPORTS**

Total tons to July 27 12,272

*From daily transactions on the New York Metal Exchange.
†Nominal.

New Incorporations

The Fairfield Electric Light & Power Company of Highland Springs, Va., has been granted a charter with a capital stock of $5,000. The officers are G. T. Collins, president,

The Brunston Automatic Electric Lighting & Power Company has filed articles of incorporation under the laws of the State of Delaware. The company is capitalized at $1,000,000 and purposes to generate and distribute electricity and to deal in electric-lighting, heating and power devices. The incorporators are William J. Maloney, Herbert E. Latter and Norman P. Coffin, all of Wilmington, Del.

New Industrial Companies

The Advance Electric Company of Cleveland, Ohio, has been incorporated with a capital stock of $2,000 by J. W. Abel, William Langer, W. R. Winn, Z. F. Harris and C. J. Buckley.

The Essex Electric Company of Newark, N. J., has been chartered with a capital stock of $125,000 to manufacture electrical appliances. The incorporators are: J. H. Lippincott, Thomas S. Woodruff and William A. Smith, all of New York, N. Y.

The Electrolytic Metals Company has filed articles of incorporation under the laws of the State of New York with a capital stock of $100,000. The incorporators are: M. Hersch, J. J. and H. J. Wile, 2100 Druid Hill Avenue, Baltimore, Md. The company proposes to do a general metallic magnesium, alloys, mining and milling business.

Trade Publications

Metallic Packing.—The Strong Machinery & Supply Company, 48 Franklin Street, New York, has issued an illustrated booklet which contains information on various kinds of metallic packing.

Combination Switches.—The Trumbull Electric Manufacturing Company, Plainville, Conn., has issued an illustrated leaflet containing information on its "Circle T" combination switches.

Lighting Fixtures.—The Reading Chandelier Works, 503 Penn Street, Reading, Pa., have issued a 124-page catalog showing the company's latest designs in electroliers, gas and combination fixtures.

Electrical Devices.—The Lincoln Electric Works, 112 West Adams Street, Chicago, Ill., have prepared an illustrated folder which describes various types of electrical devices which they manufacture.

Boiler-Tube Cleaners.—The Lagonda Manufacturing Company, Springfield, Ohio, has published a catalog entitled "Lagonda Vibrator Cleaner," which contains information on a device for cleaning fire-tube boilers.

Storage Battery for Automobiles.—The Electric Storage Battery Company, Philadelphia, Pa., has just issued the sixth edition of Catalog SL, which contains information on the type XC "Exide" battery for automobile starting and lighting service.

Lighting Fixtures.—The Wheeler Reflector Company, 156 Pearl Street, Boston, Mass., is sending out a loose-leaf catalog which contains its Bulletin R, on various types of reflectors; Bulletin S, on street fixtures, and Bulletin M, on miscellaneous types of lighting fixtures.

Ornamental Lighting Fixtures.—The Alter Light Company, Chicago, Ill., has issued sheets 72-A and 16-A, which illustrate several types of pendent fixtures and hooks for drilled and undrilled bowls. The sheets are to be added to the general catalog issued by the company.

Current-Limiting Reactors.—The Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., is sending out reprints of a paper presented at the meeting of the Society of Mechanical, Electrical and Steam Engineers, at Toledo, Ohio, entitled "The Use of Current-Limiting Reactors," by W. N. Bann and H. H. Rudd.

Construction News

New England

BEVERLY, MASS.—Plans are being considered for equipping the new pumping station at Wenham (for additional supply in Beverly and Salem) for electrical operation. Electricity will be supplied by the Beverly Gas & El. Co.

BOSTON, MASS.—Bids will be received by the Trustees for the Children of the City of Boston, 49 City Hall, Boston, until Aug. 3 for furnishing and installing a 15-kw. electric generator and engine (directly connected) at Rainsford Island. Forms of proposal may be obtained at Room 602, City Hall Annex.

FALL RIVER, MASS.—Recommendations have been approved by the Aldermanic committee for the installation of 56 4-amp. ornamental lamps in connection with present ornamental street-lighting system.

MALDEN, MASS.—Plans are being considered by Mayor Blakeley for the installation of an ornamental street-lighting system.

NEW LONDON, CONN.—The Connecticut Pwr. Co. of New London, which owns the transmission line from Falls Village to Bristol, is extending the line to Hartford, via Plainville and New Britain. The line will be carried on steel towers.

SANDY HOOK, CONN.—At a special town meeting held in the town hall in Newtown recently the Electrical Engineering & Storage Battery Co., which is to establish a plant to manufacture electric motors and other electrical equipment in Sandy Hook, was authorized to install and maintain 45 40-watt lamps on the highway from the Newtown station to the station in Sandy Hook for a period of ten years.

Middle Atlantic

BABYLON, N. Y.—The Long Island Ltg. Co., 50 Church Street, New York, has applied to the Public Service Commission for permission to purchase the property and holdings of the Babylon Pwr. Co. of Babylon and for authority to issue capital stock.

BATAVIA, N. Y.—The Geneva Lt. & Pwr. Co. of Batavia, has applied to the Public Service Commission for permission to erect transmission lines in the town and village of Elba and to exercise franchises granted by the town and village.

BINGHAMTON, N. Y.—Bids will be received by the Board of Contract and Supply, Binghamton, until Aug. 4 for construction of Fourth and Fifth Ward school buildings, including heating, ventilating, plumbing and electric wiring and equipment, including clocks and telephones. Plans and specifications may be obtained from Sanford O. Lacy, architect, Phelps Building, Binghamton. Proposals to be addressed to D. W. Foster, city clerk.

BROOKLYN, N. Y.—Bids will be received by C. B. J. Snyder, superintendent of school buildings, Department of Education, Park Avenue and Fifty-ninth Street, New York, as follows: (1) For installing electric equipment in addition to, and alterations in, Public School 18; (2) for additions, alterations and repairs to electric equipment in Public Schools 42 and 43 and Manual Training High School, borough of Brooklyn. Blank forms, plans and specifications may be obtained or seen at the above office or at branch office, 131 Livingston Street, Brooklyn.

GOWANDA, N. Y.—The property of the Keyes El. Co. of Gowanda has been purchased by George A. Larkin of Olean and others. The new company, it is understood, will make improvements to the system and entirely reconstruct the plant, which will be driven by steam instead of water-power.

LA SALLE, N. Y.—Preparations are being made by the Suburban Pwr. Co. of Niagara Falls, a subsidiary of the Niagara Falls Pwr. Co., for the construction of power station and erection of distribution system in the village of La Salle.

LITTLE FALLS, N. Y.—Plans have been prepared for the construction of a municipal building in Little Falls, to cost about $100,000. Specifications and plans for masonry, heating, plumbing and electrical work may be obtained upon application to the city clerk, Little Falls, or from William Neil Smith, architect, 101 Park Avenue, New York, upon deposit of $15, half of which will be refunded upon return of same.

NEW YORK, N. Y.—Bids will be received by the Public Service Commission for the First District, 154 Nassau Street, New York, N. Y., until Aug. 4 for construction of a railroad duct line for the Queensboro subway rapid-transit railroad. The railroad duct line is to be a sub-surface duct line consisting of 40 ducts, with manholes at intervals. Specifications, form of contract, drawings, etc., may be obtained at the office of the commission.

NEW YORK, N. Y.—Bids will be received by J. T. Fetherston, commissioner of Street Cleaning Department, Room 1245, Municipal Building, New York, until Aug. 4 for construction of a two-story office building and garage on the pier at the foot of Nineteenth Street and East River, borough of Manhattan, and the installation of an electrical system. Blank forms, plans and drawings and further information may be obtained at the above office.

NEW YORK, N. Y.—The report of the special committee appointed to make investigations as to the cause of the fire in the subway last January recommends radical changes, which include that electric wiring should be made fireproof throughout, a source of current supply for lighting, power, ventilating, signaling, fire-alarm and telephone systems, independent from the source of power current; the complete isolation of electric wiring constituting one system from the electric wiring of any other system; the installation of a system of emergency or pilot lights, supplied with current from storage batteries; a duplication of source of current for supply of general lighting system for use in emergencies; installation of a complete fire-alarm system, connecting directly with Fire Headquarters; installation of telephones every 500 ft. along the walls of the subway; the adoption of an electric signal light indicating the location of each fire-alarm station, each telephone station and each exit; the adoption of a vapor-proof type of rigid fixture for all electric lamps throughout the subway except at station platforms; the equipment of each car with an approved number of portable lamps; iron stairways from track level to street, etc.

PORT JERVIS, N. Y.—The Port Jervis Lt. & Pwr. Co. has submitted a contract to the City Council for street lighting, under which the company agrees to furnish the city with eight 400-cp. and 19 250-cp. suspended lamps and 376 lamps of 100 cp. on brackets throughout the city; the company is to furnish glassware, ventilators and compensators on ornamental street lamps and transformers and bulbs on fire-alarm posts, for which the city is to pay $12,132 per year.

AVIS, PA.—The Council is reported to be considering the installation of a new street-lighting system.

PITTSBURGH, PA.—Bids will be received at the office of the United States Engineer office, Pittsburgh, until Aug. 21 for furnishing and installing air compressors, gas engine, turbine, electric-light plant, etc., at Lock 6, Monongahela River. Further information may be obtained upon application to above office.

SINKING SPRING, PA.—The Pennsylvania Wtr. & Pwr. Co. of Holtwood is reported to have purchased the electric plant of the Sinking Spring El. Lt., Ht. & Pwr. Co., which furnishes electricity in the towns of Sinking Spring, Wyomissing, Shillington and other places along the Lebanon Valley. The new company will take over the plant early in August. Extensive improvements, it is understood, will be made.

ATLANTIC CITY, N. J.—The Atlantic El. Co. is installing a 650-hp. Babcock & Wilcox boiler with superheater, stokers, etc. F. H. Golding is vice-president and general manager.

NEWARK, N. J.—Bids will be received by the Passaic Valley Sewerage Commissioners, Essex Building, Clinton Street, Newark, until Aug. 31, for construction of superstructure and appurtenances for Newark Bay pumping station. The work will consist of engine room, screen house, boiler house, administration building, coal house, chimney, including crane runways, economizer support, steel water-storage tank, and all plumbing, electric-light wiring and fixtures, electric conduits, water-supply piping, interior and exterior decorations, etc. Drawings, form of contract and specifications and blank form of proposal may be obtained of William M. Brown, chief engineer, at commissioners' office.

PASSAIC, N. J.—The Passaic Wtr. Co. has filed a grant in the office of the county register conveying the right to the Society for Establishing Useful Manufactures to install an electric distributing system over its right-of-way.

PATERSON, N. J.—Bids will be received by the board of education, Room 24, City Hall, Paterson, until Aug. 2 for installation of a steam and electric power plant for the Paterson High School. Plans and specifications may be seen at the offices of the board of education, Paterson, and Louis E. Eden, consulting engineer, No. 1 Madison Avenue, New York, N. Y.

KENOVA, W. VA.—Thomas F. Bailey, Jr., is reported to be interested in a project for the conversion of the Kenova steel plant into a factory for the manufacture of electrically operated mine cars. A company has been organized and will soon be incorporated.

LEBANON, VA.—Preparations are being made by local business men, it is reported, for the installation of an electric light and power plant in Lebanon. The construction of an ice factory in connection with electric plant is also under consideration.

WASHINGTON, D. C.—Bids will be received at the Bureau of Supplies and Accounts, Navy Department, Washington, D. C., until Aug. 3 for furnishing at the various navy yards and naval stations supplies as follows: Boston, Mass., Schedule 8623—5000 lb. soft-steel wire. Brooklyn, N. Y., Schedule 8625—Miscellaneous interior communication cable, 260,000 ft. bell wire, 320,000 ft. double-conductor wire, miscellaneous single-conductor wire, miscellaneous twin-conductor wire; Schedule 8619—13,500 ft. lighting and power wire; Schedule 8624—miscellaneous brass sheet and miscellaneous copper sheet. Bids will also be received until Aug. 24 for the following supplies: Boston, Mass., Schedule 8628—miscellaneous chain, close and stud-link cable. Puget Sound, Wash., Schedule 8614—miscellaneous laundry machinery (washers, extractors, ironers and wash-tubs). Bids will also be received until Sept. 7 as follows: Pearl Harbor, Hawaii, Schedule 8615—14 subway-type fuse boxes, miscellaneous one-conductor and three-conductor cable, miscellaneous fiber duct, miscellaneous integrating watt-hour meters, miscellaneous subway-type transformers; Schedule 8616—miscellaneous manhole frames and covers. Applications for proposals should designate the schedule desired by number.

North Central

DETROIT, MICH.—Bids will be received at the office of the secretary of board of education, 50 Broadway, Detroit, until Aug. 10 for erection of a 20-room school building, to be situated on Montclair and Meadowbrook Avenues, Detroit, as follows: For entire work; also separate proposals under four-bid form as follows: General masonry work, general carpentry work, heating, ventilating and plumbing, and electric wiring. Plans and specifications may be seen at the offices of Malcolmson & Higginbotham, architects, 404 Moffat Building, Detroit, and Ammerman & McColl, consulting engineers, 1310 Penobscot Building, Detroit.

EAST JORDAN, MICH.—The East Jordan El. Lt. & Pwr. Co. expects soon to purchase shaker grates for two horizontal boilers (72 in. by 18 ft.). L. G. Balch is superintendent.

MARINE CITY, MICH.—The Council has accepted the proposal submitted by the Edison El. Illg. Co. of Detroit to furnish electricity for lighting the streets and public buildings for a period of 30 years. An election will be held Aug. 9 to submit the proposition to the voters.

MONROE, MICH.—Plans are being prepared for the erection of a new plant for the Weis Fibre Container Corp. on West Front Street. The main building will be 220 ft. by 90 ft. and the power house will be built separately. The plant will be equipped with electric-motor-driven machinery.

SPARTA, MICH.—Bonds to the amount of $12,000 have been voted for the installation of a municipal electric-light plant.

ARLINGTON, OHIO.—Within the next six months the Board of Public Works expects to purchase some arc lamps, two or three transformers and some meters.

ATTICA, OHIO.—The villages of Attica, Bloomville and New Washington, each of which has a municipally owned electric plant, are considering the installation of a central power station to supply the three towns with energy. The proposed plant would be situated in Attica, which is 8 miles from each of the other villages, and midway between them. If the project is carried through, a 24-hour service would be established.

BUTLER, OHIO.—The Board of Public Affairs expects to purchase from 100 to 200 meters and probably a few incandescent lamps within the next six months.

CAMBRIDGE, OHIO.—Bids will be received at the office of T. D. E. Lee, director of public service, Cambridge, until Aug. 5 for additions to the municipal water-works system, including storage reservoir, filter plant, pumping machinery, additional boilers, station building, pipe lines, etc. Plans and specifications are on file in the offices of the director of public service, Cambridge, and the W. J. Sherman Co., engineer, Toledo. Bids will be received on the whole or any portion of the work.

CINCINNATI, OHIO.—The municipal Electrical Department is planning to install a complete new wiring and electric illuminating system for the old Sixth Street market, to replace the gasoline torchlights now in use. When this is completed the other two markets will be wired and lighted by electricity.

CLEVELAND, OHIO.—Plans are being prepared by the Department of Public Service for extending the ornamental lighting system on Chestnut and Walnut Avenues, between East Ninth and East Twelfth Streets.

CLEVELAND, OHIO.—Bids will be received at the office of commissioner of purchases and supplies, Room 511, City Hall, Cleveland, until Aug. 6 for ornamental standards for ornamental lighting system for the municipal Electric Light Department. Specifications may be obtained at the office of commissioner of light and heat division, 1443 East Third Street.

DEFIANCE, OHIO.—Within the next thirty days the Auglaize Pwr. Co. of Defiance expects to purchase one 33,000-volt, three-pole disconnecting switch and horn-gap lightning arresters to use in conjunction with above switch. W. P. Wallace is general manager.

GALION, OHIO.—Within the next six months the director of public service will purchase for the municipal electric-light plant meters and transformers as needed.

GIRARD, OHIO.—Plans are being considered for improvements to the street-lighting system. The Youngstown Consol. Gas & El. Co. of Youngstown furnishes electrical service in Girard.

MANSFIELD, OHIO.—The City Council has closed a contract with the Mansfield Ry., Lt. & Pwr. Co. for installing and maintaining an ornamental street-lighting system for a period of ten years. Nitrogen lamps will replace arc lamps and arches throughout the entire system.

NEW LEBANON, OHIO.—The Village Council has awarded the contract for lighting the streets and public places for a period of ten years to the Ohio El. R. R. Co.

STRASBURG, OHIO.—The Public Utilities Commission has authorized the sale of the plant and buildings of the Strasburg El. Co. to the Ohio Ser. Co. of Coshocton. The price is placed at $10,000.

YOUNGSTOWN, OHIO. — Preparations are being made by the Republic Iron & Steel Co. for the construction of two new open-hearth furnaces and two tube mills. The output of the power plant, it is understood, will be increased by the installation of a 2400-kw. generator and other electrical equipment.

SMITHLAND, KY.—Plans are being considered to organize a company to establish an electric-light plant in Smithland. J. W. Watters and V. D. Pressnell are interested in the company.

BICKNELL, IND.—The City Council has granted the Tecumseh Mining Co. a franchise to erect an electric line to the Martin and Freeman mines. The line later will be extended to Indian Creek and Aliceville.

BROOKVILLE, IND.—The Brookville El. Co. has applied to the Public Service Commission for permission to issue $10,000 in bonds, the proceeds to be used for improvements to plant.

FORT WAYNE, IND.—Proposals, it is reported, were submitted for the ornamental lamp standards for the lighting system on Breckenridge Street. The Board of Public Works, it is understood, will readvertise for bids.

INDIANAPOLIS, IND.—The Merchants' Ht. & Lt. Co. of Indianapolis has applied to the Board of County Commissioners for permission to erect transmission lines along the National and Rockville roads for the purpose of supplying electricity to towns in Hendricks County.

NORTH VERNON, IND.—The North Vernon Lumber Co., which is equipping its furniture factory for electrical operation (it is reported), contemplates the installation of an electric power plant and will purchase generating equipment and motors. Plans also provide for an addition of about 5000 ft. of floor space.

ROCKPORT, IND.—The Rockport Wtr. Wks. Co. is installing two new Skinner engines, one 80-hp., belted type, and one 160-hp., directly connected to generator.

MATTESON, ILL.—The Village Board has renewed the contract with the Public Service Co. of Northern Illinois of Chicago for lighting the streets of the village for a period of ten years. Under the terms of the contract the present lamps are to be replaced with lamps of 100 cp.

NORMAL, ILL.—Bids will be received by the Board of Administration, Capitol Building, Springfield, until Aug. 16 for electric wiring, motors and accessories at the Soldiers' Orphans' Home at Normal. Specifications may be obtained upon application to Mrs. C. E. Bassett, acting managing officer, Normal.

CHIPPEWA FALLS, WIS.—The Wisconsin-Minnesota Pwr. & Lt. Co. of Chippewa Falls is reported to be contemplating the construction of a dam at Paint Creek.

MADISON, WIS.—The Madison Gas & El. Co. awarded the contract for the construction of a substation on Blount Street, near its present plant, to T. C. McCarthy. The cost of the station is estimated at $15,000.

NEW RICHMOND, WIS.—The village of Richmond has voted to install an ornamental street-lighting system.

RACINE, WIS.—The Wisconsin Gas & El. Co. of Racine has applied to the Public Utilities Commission for permission to increase its capital stock from $2,000,000 to $2,750,000.

SUPERIOR, WIS.—Bids will be received by Rev. A. Gawenda, rector, 1414 Birch Avenue, Superior, until Aug. 5, for the erection of school and church building; also for heating, plumbing and wiring. Plans and specifications are on file in the Builders' Exchanges in St. Paul and Minneapolis, Minn. Victor Cordella, 518 Kasota Block, Minneapolis, is architect.

ELLENDALE, MINN.—The installation of an electric-lighting system in Ellendale is reported to be under consideration.

FARIBAULT, MINN.—Bids will be received by the State Board of Control, State Capitol Building, St. Paul, until Aug. 3 for power-plant equipment for State School for Feeble-Minded, Faribault, including mechanical stokers, economizer equipment, boiler settings, alterations to and covering for breeching, water weigher, regulators, pipe and fittings, etc., and steel tank and tower. Bids are to be submitted only on forms supplied by Charles L. Pillsbury, engineer, of St. Paul and Minneapolis, where plans and specifications may be seen and obtained.

HARDWICK, MINN.—Bonds to the amount of $5,000, it is reported, have been voted for remodeling the municipal electric-light plant.

HASTINGS, MINN.—Bids will be received by the State Board of Control, State Capitol Building, St. Paul, until Aug. 10 for construction of new east wing, main building, at Hastings State Asylum, including general contract work, plumbing and electric work, in accordance with plans and specifications prepared by C. H. Johnson, architect, 715 Capital Bank Building, St. Paul.

HIBBING, MINN.—The contract for the erection of an extension to the high-tension transmission line is reported to have been awarded to A. L. Dyson.

MINNEAPOLIS, MINN.—Plans are being made by the El. Short Line Ry. Co. of Minneapolis to construct a new railway this year (45 miles long), to cost about $40,000. Bids will soon be asked, it is reported, for the erection of the new terminal station at Seventh and Holden Streets and Third Avenue N.

ROCHESTER, MINN.—Bids, it is understood, will soon be asked for construction of the proposed new municipal electric-lighting plant, to cost about $110,000.

ST. CLOUD, MINN.—Ornamental lamps, it is reported, will be installed on Sixth and Seventh Streets.

ST. PETER, MINN.—Bids will be received by the State Board of Control, State Capitol Building, St. Paul, until Aug. 3 for power-plant equipment for the St. Peter State Hospital, including mechanical stokers, coal-handling machinery, new boiler settings, and pipe and fittings. Plans and specifications may be seen at the offices of the superintendent, St. Peter State Hospital, St. Peter, the Board of Control, St. Paul, and the Charles L. Pillsbury Co., engineer, St. Paul and Minneapolis.

SOUTH STILLWATER, MINN.—Bids will be received by Oscar Huhnke, village recorder, for erection of extension of 2200-volt, three-phase pole transmission line, including transformers and all necessary connections. Plans and specifications are on file at the office of the village recorder.

WORTHINGTON, MINN.—Bids will be received by the State Board of Control, State Capitol, St. Paul, Minn., until Aug. 11, for the erection of a tuberculosis sanatorium for the counties of Rock, Nobles, Murray, Pipestone, Cottonwood, Lincoln, Lyon and Jackson, at Worthington, including general construction, reinforced concrete chimney, mechanical equipment and deep-well. Plans and specifications are on file at the office of Sund & Dunham, 514 Essex Building, Minneapolis; Rose & Harris, Auditorium Building, Minneapolis; also at the Builders' Exchanges at Minneapolis, St. Paul and Duluth.

DYERSVILLE, IOWA.—At a special election held July 12 the proposal to grant the Eastern Iowa Lt. & Pwr. Co. of Anamosa a franchise to supply electricity in Dyersville was carried.

FARLEY, IOWA.—At an election held July 12 the proposal to grant the Eastern Iowa Lt. & Pwr. Co. of Anamosa a franchise to extend its high-tension transmission line to Farley and erect a distributing system to supply electricity here was carried.

FOREST CITY, IOWA.—Bids will be received until Aug. 16 by H. R. Irish, president of the independent school district of Forest City, for the construction of a new high and grade school, including general construction, heating and plumbing, electrical work and fixtures, manual-training, domestic-science and gymnasium equipment. Copies of plans and specifications may be obtained at the office of Alban & Lockhart, architects, 347 Endicott Building, St. Paul, Minn., upon deposit of $10.

MARBLE ROCK, IOWA.—Bonds to the amount of $4,500 for the installation of an electric lighting and power system have been voted.

RIPPEY, IOWA.—The installation of a municipal electric-lighting plant is reported to be under consideration. Electricity for operating the system will probably be obtained from the Perry system of the Iowa Lt. & Pwr. Co.

SOMERS, IOWA.—Bids will be received by the board of education of the consolidated independent school district of Somers until Aug. 12 for the construction of high-school building, including heating, plumbing and wiring. Plans and specifications are on file at the offices of the school board, Somers, and Thomas W. Reely, architect, 1202 Central Avenue, Fort Dodge.

WILTON, IOWA.—The contract for additional equipment for municipal electric plant has been awarded to the El. Const. & Machinery Co. of Rock Island, Ill., at $4,328.

CARDWELL, MO.—The City Council has granted the Crystal Ice Co. of Paragould a franchise to supply electricity in Cardwell.

CLINTON, MO.—Within the next six months the city Electric Light Department expects to purchase transformers, meters, lightning arresters, insulators, incandescent lamps, wiring supplies, switches, heating and cooking apparatus. Watson Hart is clerk of Electric Light Department.

ENDERLINE, N. D.—The Enderline El. Lt. & Pwr. Co. has been granted a franchise to supply electricity for lamps and motors in Sheldon.

FARGO, N. D.—Bids will be received at the office of the supervising architect, Treasury Department, Washington, D. C., until Aug. 20 for two new boilers, to be installed in the United States post office and court house at Fargo, N. D. For details see proposal columns.

KINGSTON, N. D.—Improvements, it is reported, are contemplated to the municipal electric-light plant.

MILNOR, N. D.—The Council is reported to have granted a franchise to D. L. Vail and associates to install and operate an electric-lighting plant in Milnor.

YANKTON, S. D.—The city of Yankton is not considering the construction of a municipal electric-light plant as reported in the issue of July 17, but is contemplating the installation of an ornamental street-lighting system. John W. Summers is city auditor.

ATKINSON, NEB.—Within the next three months J. Kradla & Sons, owners of the local electric-light plant, expect to purchase a waterwheel governor and a 4-kw. exciter; also within the next 30 days to purchase some wiring supplies.

GRAND ISLAND, NEB.—The Central Nebraska Pwr. Co., which is developing a hydroelectric power project at Boelus, is reported to have taken over the Grand Island El. Co., together with franchises, lines and properties in Howard County, including the water-power site and canal at Boelus. Deeds have been filed by the Central Nebraska El. Co. giving a mortgage to the Continental & Commercial Trust Co. and Frank H. Jones of Cook County, Ill., to secure a bond issue not to exceed $2,500,000. This mortgage will provide sufficient funds to complete the Boelus project and for expansion in that part of the State.

HASTINGS, NEB.—The city of Hastings contemplates the installation of an additional turgo-generator unit in the municipal electric-light plant during 1915. W. S. Watson is manager and purchasing agent.

PERU, NEB.—Within the next three months the Peru El. Lt. & Pwr. Co. expects to install an 80-hp. boiler, one circulating and one vacuum pump, and possibly other condensing apparatus. H. Hallenbeck is manager.

LARNED, KAN.—The Council is reported to be considering the installation of an ornamental street-lighting system.

NETAWKA, KAN.—At an election held recently bonds to the amount of $10,000 were voted for the installation of an electric-light plant.

REPUBLIC, KAN.—Bonds to the amount of $6,500, it is reported, have been voted for the installation of an electric-lighting system in Republic. Electricity for operating the system will be obtained from the Concordia El. Co. of Concordia, connection to be made from Courtland.

ROBINSON, KAN.—The city of Robinson has engaged R. H. Love of Hiawatha, engineer, to take charge of the installation of the municipal electric-lighting system, for which bonds to the amount of $10,000 were recently voted.

SHARON SPRINGS, KAN.—Preliminary plans are being prepared for the construction of a municipal electric-light plant in Sharon Springs. W. E. Hulse & Co., 208 First National Bank Building, Hutchinson, are consulting engineers.

Southern States

RALEIGH, N. C.—Arrangements are being made by the city of Raleigh for the installation of an ornamental street-lighting system, covering eleven blocks in the business district. The city expects to purchase in the near future 70 or 80 one-lamp standards with ornamental arm for magnetite-arc lamps. The standards will be approximately 14 ft. in height and arranged to accommodate iron trolley poles. Further information may be obtained by addressing N. L. Walker, electrical engineer, or Col. Joseph E. Pogue, chairmen of committee.

AIKEN, S. C.—The Augusta-Aiken Ry. & El. Corpn., it is reported, is planning to extend its line from Aiken to Columbia, S. C., a distance of 50 miles. R. W. Spofford of Augusta, Ga., is general superintendent.

PALATKA, FLA.—Bids will be received at the office of the supervising architect, Treasury Department, Washington, D. C., until Aug. 27 for the construction, including mechanical equipment, lighting fixtures and approaches, of United States post office at Palatka. Drawings and specifications may be obtained at the above office or from the custodian of site at Palatka.

PUNTA GORDA, FLA.—The Municipal Electric Light Department is extending the street-lighting circuit and is contemplating changing same from 220 volts transmission to higher voltage and putting lamps in series. R. D. Morgan is superintendent.

BOLIVAR, TENN.—The electric-light plant, laundry and several other buildings at the Western Tennessee Hospital for the Insane, near Bolivar, were recently destroyed by fire, causing a loss of about $50,000.

WINONA, MISS.—Within the next six months the Winona Wtr., Sewerage, Ice & Lt. Co. expects to purchase 5000 ft. of weatherproof wire. W. H. Harvey is president and manager.

MARMADUKE, ARK.—The Council is reported to have granted the Crystal Ice Co. of Paragould a franchise to furnish electricity for lamps and motors in Marmaduke.

CEDAR GROVE, LA.—The municipality of Cedar Grove has granted the Southwestern Gas & El. Co. of Shreveport a 25-year franchise to supply electricity for lamps and motors here. The company was also given a contract for lighting the streets of the town for a period of ten years, under the terms of which it is to furnish twenty-four 100-watt lamps. The line will be extended from South Highlands to Cedar Grove.

ATOKA, OKLA.—The Pub. Ser. Co. of Oklahoma expects to erect three miles of transmission lines within the next three months. Main office of the company is in the Concord Building, Oklahoma City.

BOSWELL, OKLA.—Bids will be received by the board of trustees, Boswell, until Aug. 12 for the following equipment: one 50-kva., 2300-volt belt-driven generator and exciter, two-panel switchboard, transformers, series regulator, watt-hour meters, wire, poles and pole-line equipment. Bids will also be received on water meters, fire hose and hose carts. For details see proposal columns. James T. George is engineer.

NORMAN, OKLA.—The Norman Tel. Co. will install about 1200 ft. of underground conduit during the next month. Harold V. Bozell, consulting engineer of Norman, will have charge of the work.

OKLAHOMA CITY, OKLA.—The Pub. Ser. Co. of Oklahoma, Concord Building, Oklahoma City, expects to erect 9 miles of 6600-volt transmission line to supply electricity to coal mines in the vicinity of Lehigh. Burton French is engineer.

SHELBINA, OKLA.—The Municipal Electric Light Department expects to purchase one 7½-kw., 2300/110-volt transformer. E. P. Weaver is superintendent.

BRANDON, TEX.—The Texas Pwr. & Lt. Co. of Dallas is contemplating the installation of an electric-lighting system in Brandon. The transmission line will be extended from Milford.

DALLAS, TEX.—Plans have been approved for the installation of a 200-kw. generator and engine in the county power plant, which is installed in the basement of the jail and criminal courts building.

LOCKHART, TEX.—A company, it is reported, is being organized by E. B. Coopwood of Lockhart for the purpose of constructing an electric-light plant and waterworks system here. The company will be capitalized at $100,000.

SEGUIN, TEX.—Bids will be received by the board of trustees of the Seguin El. Lt. & Pwr. Co., Seguin, until Aug. 10 for electrical and mechanical equipment as follows: Waterwheels, transmission apparatus, generator and switchboards. Proposals for mechanical and electrical equipment will be considered separately and collectively. Plans and specifications may be seen at the office of the company at Seguin, or copies may be obtained of the company upon deposit of $10. Owen A. Gofford is manager.

Pacific States

PRESCOTT, WASH.—The Pacific Pwr. & Lt. Co. of Portland has applied to the City Council for a franchise to supply electricity in Prescott.

SEATTLE, WASH.—A. H. Dimock, city engineer, in a recent communication to the City Council, pointed out the possibilities for the development of the Sauk and Suiattle River projects, whereby 167,000 hp. could be developed and transmitted to Seattle at a cost of approximately $16,000,000. He asks that an immediate appropriation to conduct additional surveys be made. The report on the proposed development was prepared by Robert Howe, consulting civil and electrical engineer of Seattle. In his report Mr. Howe estimates that an initial installation capable of developing 44,000 hp. is possible, at a cost of $4,300,000. The location of the proposed development is in the vicinity of Derrington, and the length of the transmission line would be 75 miles.

SEQUIM, WASH.—The Sequim Lt. & Pwr. Co. is installing an electric-lighting system. The equipment will consist of one 66,000/6600 transformer and many small ones, Westinghouse switchboard apparatus for alternating-current, 60 cycles; overhead material for 9 miles for primary loop, 300 cedar poles 40 ft. 8 in. long, 75 Westinghouse meters; tungsten lamps will be used for street-lighting. The company will carry a small stock of electrical supplies of all kinds. A. E. Pierce of Sequim is engineer.

BUENA PARK, CAL.—An election will be held Aug. 10 to vote on the proposal to form a lighting district at Buena Park.

FORT MASON, SAN FRANCISCO, CAL.—Bids will be received at the office of the depot quartermaster, Fort Mason, San Francisco, Cal., until Aug. 16, for furnishing during the fiscal year ending June 30, 1916, acid, ammonia, bags, electrical and hardware and plumbing supplies, etc. Further information may be obtained on application to the above office.

QUINCY, CAL.—The Board of Supervisors has granted the Great Western Pwr. Co. of San Francisco permission to erect a pole transmission line from the Nevis Dam in Big Meadows to the Engels Copper Mine in Lights Canyon, a distance of 35 miles.

RIVERSIDE, CAL.—Estimates have been submitted by Elmer Cutting, superintendent of the electric-light department, of the cost of installing an electric generating plant on the site of the power house of the Pacific Lt. & Pwr. Co. at Highgrove, which was recently burned. The cost of plant, with an output of 200 kva., is placed at $12,000, and that of the transmission line from present plant to city line at $7,576.

SANTA BARBARA, CAL.—Plans are being considered for the installation of an ornamental street-lighting system on West Boulevard, to cost about $4,000.

ALBION, IDAHO.—An election will be held Aug. 23 to submit the proposal to issue bonds for the installation of an electrical distribution system in Albion. Electricity for operating the system will be obtained from the plant of the United States Reclamation Service at Minidoka. The Reclamation Service will erect a transmission line, 9 miles long, and the substation at Albion. Electrical service will also be furnished to the State Normal School near Albion. G. A. Axline is president of the State Normal School, Andrew Lounsbury is president of board of village trustees, and B. Dibble of Minidoka is engineer of reclamation service.

ST. ANTHONY, IDAHO.—The City Council has appointed a committee to negotiate with the Utah Pwr. & Lt. Co. for the purchase of its local electric plant, to be owned and operated by the municipality. If the plant is taken over by the city, improvements and extensions, it is understood, will be made in the near future.

WARDNER, IDAHO.—A committee has been appointed by the City Council to make investigations as to the feasibility of establishing a municipal electric-light plant in Wardner.

SALT LAKE CITY, UTAH.—The Caribou Gold Mines Co. has awarded the contract for construction for hydroelectric plant (including machinery) on Eagle Creek to R. S. Lund of Salt Lake City.

DOUGLAS, ARIZ.—A committee, consisting of Albert Stacey and M. F. Dicus, has been appointed to make investigations relative to the installation of an ornamental lighting system in Douglas.

GRAND JUNCTION, COL.—Bids will be received at the office of the supervising architect, Treasury Department, Washington, D. C., until Aug. 24 for the construction, including mechanical equipment and approaches, of the United States post office at Grand Junction. Drawings and specifications may be obtained at the above office or from the custodian of site at Grand Junction.

PLATTEVILLE, COL.—The Council is reported to have granted the Western Lt. & Pwr. Co. of Boulder a franchise to furnish electricity for lamps and motors in Platteville.

WELLINGTON, COL.—The Western Lt. & Pwr. Co. of Boulder, it is reported, has applied for a franchise to furnish electrical service in Wellington.

Canada

MISSION CITY, B. C.—The Board of Trade has appointed a committee to negotiate with the provincial government for permission to install a municipal street-lighting system in Mission City.

VANCOUVER, B. C.—The City Council, it is reported, has decided upon the installation of an ornamental cluster-lamp lighting system, to cost about $23,650.

THE NARROWS, MAN.—The Town Council is reported to be considering the installation of an electric lighting and power plant, to cost about $50,000.

AILSA CRAIG, ONT.—The transmission line and distribution system for electrical service in Ailsa Craig will be erected by the Ontario Hydro-Electric Power Commission. J. H. Castor of Toronto is engineer in charge. J. S. Smith is clerk.

EXETER, ONT.—At an election held July 16 the by-law authorizing the installation of a distribution system for hydroelectric power, at a cost of $20,000, was carried.

OTTAWA, ONT.—The engineers of the Water Power Branch, Department of the Interior, it is reported, are investigating the water-powers of Grass and Nelson Rivers with a view of furnishing energy for the electrification of the Hudson Bay Railway.

PETROLIA, ONT.—The by-law authorizing an expenditure of $35,000 for the installation of a distributing system for hydroelectric power was carried at an election held recently. The contract calls for the initial consumption of 500 hp. at $36.25 per hp.

SMITHVILLE, ONT.—At an election held recently the by-law to establish an electric-lighting system in Smithville was carried. Work, it is understood, will begin at once on the erection of the transmission line.

TORONTO, ONT.—About 6000 additional street lamps, it is understood, will be added to the Toronto Hydro-Electric system this year.

Miscellaneous

PANAMA.—Bids will be received at the office of the purchasing officer, Panama Canal, Washington, D. C., until Aug. 19, for furnishing under Circular 956 the following supplies: 50 brackets, brake shaft, 2000 ft. trolley wire, 40 cast-iron posts, 1200 ft. vulcanized-rubber strips, 800 spring plates, 12 air whistles, etc. For further information address Major F. C. Boggs, purchasing agent.

Weekly Record of Electrical Patents

UNITED STATES PATENTS ISSUED JULY 20, 1915.

[Prepared by Mitchell & Allyn, 41 Park Row, New York.]

1,146,786. TELEPHONE SYSTEM; B. M. Davis, Chicago, Ill. App. filed March 5, 1908. Two-wire automatic system.

1,146,800. IGNITION DEVICE FOR INTERNAL-COMBUSTION ENGINES; J. S. Kendall, Hamilton, Ontario, Canada. App. filed Aug. 3, 1914. Produces a succession of sparks for each explosion.

1,146,806. BATTERY CASE; R. H. Manson, Elyria, Ohio. App. filed Sept. 24, 1913. Automatically connects the dry cells in proper relation.

1,146,872. COMBINATION ELECTRICAL SWITCH AND CLUTCH-ACTUATING MECHANISM; E. V. Hartford, Deal, N. J. App. filed Aug. 9, 1913 For clutching the starter motor, upon attainment of speed, to the engine.

1,146,879. AUTOMATIC ELECTRIC-HEATING SYSTEM FOR RAILROAD CARS AND THE LIKE; L. P. Hynes, Chicago, Ill. App. filed Nov. 7, 1913. Thermostatic control.

1,146,881. BINDING POST; N. J. Jeffries, Atlantic City, N. J. App. filed March 25, 1914. Wire inserted through bore of hollow post.

1,146,883. BURGLAR ALARM; J. Jones, Jr., New York, N. Y. App. filed April 16, 1913. Box attachable to door.

1,146,885. CASING FOR LAMP SOCKETS; C. J. Klein, Milwaukee, Wis. App. filed May 2, 1914. Lock for cap of shell.

1,146,889. TELEPHONE-EXCHANGE SYSTEM; F. A. Lundquist, Ingleside, Ill. App. filed Feb. 19, 1913. Automatic selector.

1,146,924. STORAGE-BATTERY REGULATOR; F. Conrad, Swissvale, Pa. App. filed March 15, 1909. Automatically maintains battery in intermediate charged condition.

1,146,925. ELECTRICAL REGULATOR; F. Conrad, Swissvale, Pa. App. filed Feb. 3, 1910. For "booster."

1,146,926. REGULATOR FOR ELECTRICAL CIRCUITS; F. Conrad, Swissvale, Pa. App. filed Feb. 3, 1910. Adjusts without "pumping" or "hunting."

1,146,927. ELECTRICAL REGULATOR; F. Conrad, Pittsburgh, Pa. App. filed April 24, 1911. For alternating current or direct current.

1,146,938. ATTACHMENT-PLUG RECEPTACLE; H Hubbell, Bridgeport, Conn. App. filed July 23, 1914. Takes plugs having attachment blades turned in different directions.

1,146,939. ELECTRIC-LIGHTING DEVICE FOR VEHICLES; D. C. Hughes, Chicago, Ill. App. filed April 10, 1913. Generator driven by engagement with wheel of motorcycle.

1,146,942. PROCESS OF TREATING LIQUIDS; C. P. Landreth, Philadelphia, Pa. App. filed Aug. 2, 1912. Water treatment; electrodes are kept in proper condition.

1,146,954. ELECTRIC REGULATOR; F. E. Ricketts, Baltimore, Md. App. filed Sept. 20, 1910. One of the contacts has a continued movement to and from engaging position.

1,146,955. ELECTRIC REGULATOR; F. E. Ricketts, Baltimore, Md. App. filed July 1, 1911. Regulating generator controls field of generator being regulated.

1,146,956. ELECTRIC REGULATOR; F. E. Ricketts, Baltimore, Md. App. filed Feb. 27, 1912. Field current of exciter controlled in accordance with requirements of armature circuit of generator.

1,146,976. IGNITION APPARATUS; R. Varley, Englewood, N. J. App. filed June 17, 1912. Readily assembled; generator or magnet construction.

1,146,979. TROUBLE LAMP; F. A. Walters, W. M. Beckman and A. W. Kohl, Minneapolis, Minn. App. filed Jan. 23, 1914. Mounted on the hat or cap.

1,146,988. DEPOSITING REPAIR METAL ACROSS AN ALTERNATING-CURRENT ARC; M. Arendt, New York, N. Y. App. filed Oct. 23, 1914. High initial voltage with inductance in series with arc.

1,146,993. BLOCK SIGNAL APPARATUS; A. Bevan, Providence, R. I. App. filed Feb. 7, 1908. Single-track trolley system.

1,147,005. ELECTRIC REGULATION; J. L. Creveling, New York, N. Y. App. filed March 6, 1912. Has means responsive to voltage fluctuations, current fluctuations and battery current.

1,147,010. WIRELESS TELEGRAPHY; R. A. Fessenden, Brant Rock, Mass. App. filed July 19, 1907. Conducting guys act as part of the antenna.

1,147,014. AUTOMATIC FIRE-ALARM SYSTEM; F. Gottschalk, Stirling, N. J. App. filed Feb. 13, 1914. Attached to telephone-receiver hook.

1,147,016. ELECTROMAGNETIC SOUND PRODUCER; L. Grubman, New York, N. Y. App. filed June 11, 1914. Electric horn for Ford automobiles.

1,147,020. ACCOUNTING SYSTEM; F. O. Heuser, Chicago, Ill. App. filed June 7, 1909. Cost distribution in industrial establishments. (Sixty-two claims.)

1,147,021. MEANS FOR PROTECTING ELECTRIC CONDUCTORS; J. T. Hickey, Raritan, N. J. App. filed April 10, 1913. Protecting shield in conjunction with supporting insulator.

1,147,025. TELEPHONY; M. L. Johnson, Chicago, Ill. App. filed April 5, 1913. Selector switches.

1,147,026. ELECTRODE FOR VAPOR-ELECTRIC APPARATUS; C. A. Kraus, Newton Highlands, and R. D. Mailey, Lynn, Mass. App. filed June 30, 1910. For suppression of agitation of liquid-mercury cathode.

1,147,038. IGNITER MAGNETO-GENERATOR; H. C. Mueller, Milwaukee, Wis. App. filed June 27, 1914. Inclosed within rim of flywheel as in Evinrude motors.

1,147,052. FIRE AND POLICE ALARM BOX; W. F. Smith, Brooklyn, N. Y. App. filed Aug. 7, 1912. Key mechanisms control spring-driven train.

1,147,053. RESETTING SIGNALING DEVICE; C. W. Stancliff, Vancouver, B. C., Can. App. filed April 16, 1914. Solenoid construction.

1,147,065. INSULATOR CLAMP OR BRACKET; J. Zieg, Lincoln, Neb. App. filed April 27, 1914. Quickly applied to cross-arms within boring holes.

1,147,071. POLYPHASE-CURRENT STARTER; E. Besag, Frankfort-on-the-Main, Germany. App. filed Sept. 15, 1913. Has rotor starters and switch mechanism.

1,147,107. ELECTRICAL MACHINE; F. Ljungström, Finspang, Sweden. App. filed March 30, 1914. Projections hold the windings against any but longitudinal displacement.

1,147,123. CONNECTION FOR CONTINUOUS-CURRENT GENERATORS; L. Schön, Essen-on-the-Ruhr, Germany. App. filed Feb. 3, 1913. Effective destruction of residual magnetism.

1,147,125. X-RAY TUBE; J. E. Seeley, Los Angeles, Cal. App. filed March 31, 1913. Double cathode for high-frequency alternating current.

1,147,150. METHOD OF OBTAINING OXIDES OF NITROGEN FROM ATMOSPHERIC AIR; F. I. du Pont, Wilmington, Del. App. filed Sept. 28, 1912. Utilizes energy of expanding air in a caloric engine.

1,147,165. ELECTRICAL FURNACE; W. H. Hampton, New York, N. Y. App. filed Feb. 28, 1913. Has means for admitting air or gases.

1,147,168. ELECTRIC MOTOR; R. M. Gilson, Pittsburgh, Pa. App. filed Jan. 11, 1912. Operative by current of only one frequency.

1,147,170. ELECTRIC MOTOR; J. S. Holliday, Wilkinsburg, Pa. App. filed July 30, 1914. Operated by current of one frequency.

1,147,171. APPARATUS FOR THE CONTROL OF ELECTRIC MOTORS; J. S. Holliday, Wilkinsburg, Pa. App. filed April 23, 1914. For railway-traffic control.

1,147,205. PORTABLE ELECTRIC LAMP; C. Bertram, Cleveland, Ohio. App. filed April 8, 1915. Wires are concealed in arms which support swinging lamp head.

1,147,209. APPARATUS FOR ELECTRIC WELDING; W. B. Cleveland, Cleveland, Ohio. App. filed Oct. 16, 1909. Brazing bonds onto rails by Herrick process.

1,147,246. TELEPHONY; M. L. Johnson, Chicago, Ill. App. filed July 17, 1913. Selector switch.

1,147,261. METHOD OF REGENERATING STORAGE BATTERIES; C. S. Palmer, Newtonville, Mass. App. filed Jan. 12, 1915. Charges and discharges lead plates in acid-sodium-sulphate.

1,147,277. ELECTRIC CIGAR LIGHTER; M. H. Spielman, New York, N. Y. App. filed Dec. 15, 1914. For automobiles.

1,147,312. TELEPHONE ATTACHMENT; D. J. Daniel, Little Rock, Ark. App. filed Aug. 19, 1914. Paper web can be drawn across mouthpiece.

1,147,347. SERVICE-METER SYSTEM FOR TELEPHONE EXCHANGES; H. S. Turner, San Diego, Cal. App. filed June 20, 1914. Particularly for battery-type telephone.

1,147,359. STEP-BY-STEP ELECTRICAL TRANSMITTING AND RECEIVING APPARATUS; A. Barr, W. Stroud and J. W. French, Anniesland, Glasgow, Scotland. App. filed Nov. 30, 1914. For indication of "bearings" on shipboard.

1,147,388. ELECTRIC HEATER; E. E. Gold, New York, N. Y. App. filed May 9, 1913. Porcelain core support for resilient coil.

1,147,389. AUTOMATIC TELEPHONE SYSTEM; C. L. Goodrum, Rochester, N. Y. App. filed July 22, 1907. Fully metallic, requiring but two wires for each subscriber's instrument.

1,147,390. SWITCHES AND CIRCUITS FOR AUTOMATIC-TELEPHONE EXCHANGES; C. L. Goodrum, Urbana, Ohio. App. filed May 5, 1909. Finder and connector switches.

1,147,396. HEATER; R. F. Hawley and F. L. Bohanan, Pullman, Ill. App. filed Aug. 20, 1912. Electric, for fire hydrants, etc.

1,147,416, VAPORIZING DEVICE; H. P. Macdonald, Montclair, N. J. App. filed Jan. 25, 1912. Engine primer.

1,147,417. SYSTEM OF DISTRIBUTION; L. C. Marburg, Milwaukee, Wis. App. filed Jan. 7, 1910. Storing and giving up of kinetic energy is accurately controlled.

1,147,422. ARC-LIGHT ELECTRODE; W. R. Mott, Lakewood, Ohio. App. filed Nov. 19, 1912. Contains carbon, a fluoride and zinc oxide.

1,147,437. SENDING DEVICE; J. N. Reynolds, Greenwich, Conn. App. filed Feb. 12, 1915. For use at telephone substation.

1,147,448. FUSE DEVICE; E. O. Schweitzer, Chicago, Ill. App. filed Feb. 19, 1912. For high-tension circuit.

1,147,450. TERMINAL CLIP; W. Shaw, Lakewood, Ohio. App. filed Aug. 6, 1912. For attachment to flexible conductor.

1,147,494. FUSE CARTRIDGE; G. E. Fisher, Cleveland, Ohio. App. filed June 22, 1914. Fuse wire can be renewed.

1,147,498. DIVIDED INSULATOR; E. H. Freeman, Trenton, N. J. App. filed Nov. 1, 1912. Formed of two interchangeable parts.

1,147,532. ELECTRIC-LAMP RECEPTACLE AND PLUG; T. A. Morris, Lansford, Pa. App. filed June 6, 1914. Lamp held in socket by spring gripping fingers.

1,147,545. BELL-RINGING DEVICE; E. Rebischung, New York, N. Y. App. filed Sept. 10, 1914. For electrically tolling bell continuously or intermittently.

1,147,558. APPARATUS FOR THE STERILIZATION OF MILK; A. Shelmerdine, Liverpool Eng. App. filed June 9, 1913. Circuitous passage of milk past electrodes.

1,147,569. VOLTAGE REGULATOR; A. A. Tirrill, Pittsburgh, Pa. App. filed Oct. 4, 1911, renewed April 14, 1915. For field excitation.

1,147,570, 1,147,571 and 1,147,573. ELECTRICAL REGULATOR; A. A. Tirrill, Pittsburgh, Pa. App. filed Oct. 5, 1911. Adjusts field excitation.

1,147,572. ELECTRICAL REGULATOR; A. A. Tirrill, Pittsburgh, Pa. App. filed Oct. 5, 1911. Charging and discharging storage battery.

1,147,574 and 1,147,575. ELECTRICAL REGULATOR; A. A. Tirrill, Pittsburgh, Pa. App. filed March 3, 1914. Adjustment of field excitation.

1,147,576. ELECTRICAL REGULATOR; A. A. Tirrill, Pittsburgh, Pa. App. filed April 1, 1915. Adjustment of field excitation.

1,147,598. DISTRIBUTER FOR ELECTRIC IGNITERS; C. T. Blake, St. Petersburg, Fla. App. filed July 15, 1914. Fixed contacts carried by the cover.

1,147,636. TELEGRAPH REPEATER; J. McKeon, Great Falls, Mont. App. filed Nov. 6, 1914. For reproducing signal in another independent circuit.

1,147,666. APPARATUS FOR ELECTRICALLY OPERATING AND CONTROLLING PLANING MACHINES AND THE LIKE RECIPROCATING TOOLS; A. P. Wood, Hale, England. App. filed Aug. 19, 1912. Reversing motor fitted to each feed screw.

1,147,682. LIFTING MAGNET; D. C. Jackson, Madison, Wis. App. filed Jan. 26, 1907. Magnetic flux increases in density near pole pieces.

1,147,686, 1,147,687 and 1,147,688. ELECTRICAL REGULATOR; O. S. Schairer, Edgwood Park, Pa. App. filed Oct. 5, 1911. For the field excitation.

1,147,692. ELECTRICAL SYSTEM OF DISTRIBUTION; F. G. Beetem, Philadelphia, Pa. App. filed June 9, 1914. Including storage battery.

1,147,696. SYSTEM OF ELECTRICAL DISTRIBUTION; J. L. Woodbridge, Philadelphia, Pa. App. filed Nov. 25, 1911. Axle-lighting system.